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THE TEACHING OF OBSTETRICS*

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AT THE meeting of this Association held last year it was resolved to submit to the Council of Medical Education of the American Medical Association and to the American Association of Medical Colleges, a plea for equal recognition of General Surgery and Obstetrics in the curricula of our medical schools.

The pathway of obstetrics, long and perilous as it has been, recalls the epic of the Odyssey. Let us hope that it will end as happily for obstetrics as it did for Ulysses who succeeded in freeing his own house and in recovering his kingdom.

From the time of the introduction of the obstetric forceps the practice of midwifery by the medical profession was fairly easy sailing, though it is of interest to note that as late as the eighteenth century there was much prejudice against the obstetrician. Gaillard Thomas writes of the feeling of the community when Dr. James Lloyd, a pupil of Smellie and Hunter, settled in Boston in 1753. He was the first of American obstetricians and was soon followed by William Shippen of Philadelphia. With these two men began the struggle to place obstetrics on a parity with medicine and surgery in America. The success of their efforts is attested to by the fact that in 1762 Dr. Shippen delivered the first course of lectures on obstetrics in Philadelphia, and four years later Dr. J. V. B. Tennant was appointed to the chair of obstetrics in New York City. From this time to the present, obstetrics has held a creditable though not too eminent position in medical education and practice.

*Address of President, American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Toronto, September 11, 1928. The transactions of this meeting will be published in a special issue of the Journal at a later date.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

In the sixteenth century Dr. Veitis of Hamburg, Germany, was condemned to the flames for attending a woman in labor; while in our own land, as late as 1754, Dr. James Lloyd of Boston and Dr. William Shippen of Philadelphia were roundly denounced for their immorality and licentiousness in a similar performance of their professional duties. But the calumny heaped upon these two men was as nothing compared to that which was meted out to Doctor James P. White as an aftermath of an obstetric demonstration in a clinic held in the Medical Department of the University of Buffalo, New York, in 1850. White was charged with the commission of acts of outrage against the rights of the community, against decency and propriety. He was libeled by the press and bitterly attacked by members of his own profession. But happily he was ably supported by members of his faculty and by such eminent men of the day as Chandler R. Gilman, Professor of Obstetrics in the College of Physicians and Surgeons of New York, Charles B. Coventry of the University of Buffalo, and Austin Flint of New York. These and many other medical men of eminence testified in the suit for libel of "The People versus Horatio N. Loomis." The vindication of Dr. White resulted in the establishment of the first obstetric teaching clinic in America and the honors go to the University of Buffalo; although it is said that in the United States the first systematic clinical instruction in obstetrics was given in Baltimore by Rohes in 1874.

The first course of lectures on midwifery given to men was probably the work of Gregorie, the younger, in 1733. Three years later Smellie began his private lectures in London to be soon followed by Strassburg, Berlin, and Gothenburg. Dr. Young of Edinburgh is authority for the statement that prior to 1751 midwifery was taught only by lectures in Paris, London, and Edinburgh and from the middle of the eighteenth century courses of lectures and lying-in institutions were established in the chief cities of Europe. Fairbairn tells us that "England lagged so far behind Scotland and the Continent that it could not boast a University Professorship of Midwifery, and, what is still more startling, till the Medical Act of 1886, it was unnecessary for the medical student to be qualified in midwifery before being registered as a practitioner."

During the course of the second half of the eighteenth century obstetrics became a part of the clinical instruction in medical schools. In this way physicians gradually took the practice of obstetrics out of the hands of the surgeons. Thus obstetrics gradually became separated from surgery. However, clinical instruction in obstetrics was still a part of surgical clinics until late in the nineteenth century in certain cities in Germany. Germany was trailing behind France, Holland, England, and Scotland when John George Roederer, at the age of twenty-five, was called to Göttingen in the middle of the

eighteenth century. In his inaugural address he claimed for obstetrics equal recognition with medicine and surgery. He founded an obstetric pavillion at Göttingen and placed German obstetrics on an equal footing with that of other countries.

It may be said that the emancipation of obstetrics from surgery was "the result of the introduction of the obstetric forceps and of the writings and labors of independent teachers of obstetrics whose endeavors were directed to the making of labors less bloody and less dangerous."

Our English colleagues (notably Prof. W. R. Dakin of Saint George's Hospital, London) are wont to speak of midwifery as the Cinderella of medicine. When we reflect upon the struggle which obstetrics has endured in securing recognition alongside of medicine and surgery, we recall the emotions of our childhood days when we believed in fairies; when we saw, in our fancies, poor little Cinderella sitting in the ashes. And how we resented the two elder, adopted sisters when they took away her toys and gave her all the hard work to do. And how she yearned for fine dresses that she, too, might go to the ball! But eventually, you will recall that Cinderella did go to the ball through the gracious metamorphosis of pumpkin, mouse-trap, mice and lizards and the kindly intervention of the fairy god-mother. To be sure, Cinderella was rebuked by her elder sisters and for a time she again found herself sobbing among the cinders. And then how delighted we were when the messenger came and drove her in a fine coach to the palace where the Prince awaited her and made her his bride. We will not pursue the story further because it does not end as we would have it for the two elder sisters. We would not depose medicine and surgery from the high positions they have attained, we only ask that obstetrics may share with them, share and share alike.

From the standpoint of emergencies requiring masterly and timely exercise of one's faculties, obstetrics may be fairly said to assume priority over all other departments of medical practice. Confronted with such emergencies as obstetrics presents, the practitioner has no time for sharpening his wits or for awaiting the assistance of a consultant. He is alone with his problem and he must fight alone. Chipman says: "I have never heard it denied that in this general equipment, a large place ought in all conscience be given to obstetrics. And yet, speaking generally of our medical schools, *this very training in obstetrics is the weakest page in the curriculum*. Our academic vision has been blinded by the brilliancy of achievements in surgery. The glamour of the operating amphitheater has lured the student and captured his imagination." And it is no small wonder that he has little stomach for the watchful waiting of the lying-in room. I submit that it is a thousand pities that so much time is utterly wasted on the

benches of amphitheaters, watching with unseeing eyes the gyrations of the scalpel. How much more would it profit the student to employ this time in observing the phenomenon of birth under the direction of a master obstetrician. The need is for more practical training and clinical instruction in the art of midwifery, and this need can only be supplied in hospitals and dispensaries.

I think it is generally conceded that the out-patient service is a poor substitute for the dispensary and the hospital and in this respect most of our teaching institutions are woefully lacking, for the simple reason that they do not have adequate hospital accommodations. To send students into homes where filth abounds, unattended by an experienced clinician and with no more than a smattering of theory to sustain him, is a ghastly business and cannot be justified by lack of adequate hospital facilities. There is no more virtue in teaching obstetrics to a group of observers than in teaching operative surgery from the benches and we all know from experience what that means. There must be direct contact and individual responsibilities if the lessons are to be driven home, and above all it is essential that the student live for a time in an obstetric atmosphere. G. W. Theobald of London, England, says: "When I reflect on the care, skill, teamwork and money expended in the operating theaters of our land in patching up broken men and women, and then reflect on the inadequate training which allows men to kill and cripple women in their prime, women who are performing the act for which they were created; when I consider the sum total of misery which is daily mounting through bad obstetrics; when I realize that the country of Simpson, Lister, Smellie, and Hunter is no longer mentioned in the literature of obstetrics, I feel constrained to make a plea for radical changes in the attitude toward midwifery, and to hope that these changes will be made by the profession before unnecessary and ill-directed control is exerted by the state."

And from another source in England we read from the pen of Comyns Berkeley that: "The present maternal and fetal mortality and morbidity associated with pregnancy and childbirth will not be appreciably improved until the midwifery service of the country is more complete, and medical students are taught midwifery more efficiently. That in the efficient training and teaching of medical students in midwifery, the community, as opposed to the individual, is more directly and personally concerned than in that of any other subject in the medical curriculum. Not only is this so on the score of health, but also for economic reasons. The only place in which the practice and art of midwifery can be properly taught is in a maternity hospital or in the maternity wards of a general hospital. And that there are not sufficient beds available for this purpose." The responsibility for this discrepancy lies, says Berkeley, at the door

of the internists and general surgeons who have never realized until quite recently, the importance of midwifery to the nation, with the result that insufficient beds were allotted to the department of midwifery; too little time was provided for instruction and the facilities for teaching, laboratory and research work were inadequate. "Thus it came to pass that the ideas of medical students with respect to the importance of midwifery to the community were the result of a vicious circle." Indeed, it was not until 1869 that in England midwifery was included as a compulsory subject in the curriculum of medical students. And yet no less an authority than Dr. Fairbairn says that "in the efficient practice of midwifery is to be found the greatest example of preventive medicine in the medical curriculum."

In the report of the Committee on Maternal Welfare (1925) the statement is made that the services of the general practitioner are proportioned about as follows: Internal medicine, 50 per cent; obstetrics, 35 per cent; minor surgery, fractures, life insurance, etc., 15 per cent. A study of the curricula of our medical schools showed that in actual teaching hours the ratio of obstetrics to general surgery, exclusive of surgical specialties, was as 4 to 18. Clearly, then, there is cause for a revamping of the curriculum if the needs of the general practitioner are to be adequately provided.

Dean Emerson of the College of Medicine of the University of Indiana says: "It is the business of medical schools to prepare students for the first two years of the practice of medicine." It is presumed that with such an equipment the graduate will acquire added knowledge and skill to the end that he may assume larger responsibilities. Assuming that the premises of Dean Emerson are reasonable what, then, we ask, are likely to be the demands of the first two years of practice in relation to general surgery and obstetrics? A knowledge of surgical diagnosis and the ability to do minor surgery and to administer first aid in major surgical lesions would seem to be all that could reasonably be demanded of a young practitioner of medicine. But in the practice of obstetrics, there is no problem, however grave, that may not require the services of the neophyte in medicine. Placenta previa, eclampsia, ectopic pregnancy, ruptured uterus, contracted pelvis; these and many other obstetric problems may present themselves in the earliest years of practice and under conditions that admit of no opportunity to shift responsibilities. More than this it will be as incumbent upon the young practitioner, as upon the older and more experienced, to recognize the danger signals and to exercise the needed skill to avoid disaster.

And so I assume that it is indeed a reasonable request that the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons make to those who are empowered to regulate the curriculum in our medical schools, that the teaching of obstetrics be given

more equitable recognition, to the end that our graduates of medicine may be reasonably prepared to meet the demands of the general practice of medicine.

More than four hundred letters of inquiry were sent to the deans of medical schools all over the world, exclusive of the United States, and to a group of obstetricians representing the entire medical world. The response was most generous and courteous. I have appended an analysis of the replies and will here quote from some of them:

Professor R. W. Johnstone of the University of Edinburgh writes: "In my valedictory address to the Edinburgh Obstetrical Society last month I referred to this same subject and my complaint was exactly the same as yours; namely, that the time allotted to obstetrics in our present curriculum is relatively and absolutely too little." Johnstone finds no fault with the systematic teaching of obstetrics, but says: "When one considers the vital importance of practical obstetrics it is absurd that three months should be allotted to this subject and a similar period of time allotted to such other subjects as tuberculosis, diseases of the ear, nose and throat and even to diseases of the skin."

Mr. Herbert Spencer of London, England, writes that "An effort is being made in England to devote the same amount of time to obstetrics and gynecology as to medicine and general surgery." Beckwith Whitehouse of Birmingham, England, confirms this statement and says that in England the "importance of the subject is being recognized more and more each year."

Dr. Fletcher Shaw of Manchester University quotes an old teacher of his, Sir William Sinclair, "Students are taught surgery which they will not practice and later practice midwifery which they were not taught."

We learn from Professor N. S. Wales of the University of Sydney, Australia, that in the medical schools of Australia obstetrics does not share equally with general surgery and that in his opinion "it is not necessary, as a great deal of obstetric work is founded on surgical science and technic which are learned in surgical lectures and demonstrations." Again from Australia we hear from Professor Ch. M. Syd of the University of Adelaide that "The teaching of obstetrics in Australia has, until quite recently, been much neglected." Dr. H. Howitt writes: "In my active days the medical schools of Canada gave obstetrics (exclusive of gynecology) an equal number of teaching hours to that of general surgery. So, too, was it the case in England in my student days—not so today."

Professor Kedarnath Das of Calcutta, India, tells us that the majority of cases are attended by midwives and the practitioner is usually sent for in difficult cases. He says, "I feel very strongly that students of midwifery are denied their legitimate privilege of witnessing their professors of obstetrics performing obstetric operations, while they obtain the fullest advantage of observing surgical operations performed by their professors of surgery."

From Cardiff, Professor E. J. MacLean writes that in common with other teachers of obstetrics in Great Britain he is having considerable difficulty in securing what one might regard as even a moderate allocation of the curriculum for the teaching of obstetrics whether theoretical or practical. "I am convinced," says he, "that unless and until this wrong is righted there is but little hope of substantially reducing the puerperal mortality and morbidity rates which are truly regarded as a subject of world-wide concern."

Professor A. F. Hamilton of Byculla, Bombay, India, writes of the embarrassment of teaching obstetrics in India because of the caste and purdah systems in

vogue, women being reluctant to be attended by male doctors. Nevertheless, 1200 to 1400 cases are delivered annually and a considerable proportion of these are abnormal cases. Each student is required to conduct deliveries in 20 cases and is permitted to witness many scores of cases. "Our trouble here," says Professor Hamilton, "is to persuade pregnant women of the value of antenatal observation. They are so ignorant and apathetic and hence we still have far too many tragedies."

Dr. G. W. Theobald, Professor of Obstetrics and Gynecology at the Chulalongkorn University, Bangkok, Siam, has the following to say: "I very much regret that obstetrics does not share equally with general surgery in teaching hours. Basing its figures on those suggested by the Association of American Medical Colleges, the faculty have reduced the number of hours devoted to obstetrics, and would have liked to reduce them still further. At present the hours are divided as follows: pathology 647; medicine 1108; surgery 757; obstetrics and gynecology 402.

"It is rather interesting to reflect that in this country the greatest single cause of death is almost certainly puerperal sepsis. There are many more deaths as the result of childbirth than there are from cholera, typhoid, typhus, and plague put together. The maternal and infant deaths account for over one-third (probably nearly a half), of the total deaths in the country in any one year. Yet, in order to model itself as closely as possible on the American system, obstetrics, the most important subject in this country, is relegated to the least important place in the curriculum, and pathology is allowed half as many hours again, although not 10 per cent of the students will ever own a microscope.

"Sitting in far away Bangkok, by the side of the Klongs, in the sound of the Cremation Rockets, I have the feeling that logic and argument will offer but little appeal to our profession, and that the women will go on being butchered, until such time as a relatively trivial incident will somehow startle the public and cause the necessary changes to be made in a manner which may be unfortunate."

Professor de Ott of Leningrad sends greetings to our Association and tells us that in his school obstetrics shares equally with surgery in teaching hours. From 500 to 600 students annually receive instruction in his gynecologic institute.

J. Preston Maxwell, from the Peking Union Medical School, writes that "In no place in China does obstetrics share with general surgery the same number of teaching hours, and in most of the schools the obstetric teaching is in an infant condition. It must be remembered that obstetrics has had to make its way in this country against considerable odds due to prejudice and custom. It is now showing healthy signs of growth and all over the land quite apart from the medical schools, the training of midwives is in the air, and this is in the hands of the medical profession."

From Professor Robert Dolbey of Cairo we learn that "In the medical schools of Egypt obstetrics does not share equally with general surgery in teaching hours, but obstetrics and gynecology together do." He says, "We live under peculiar difficulties in Egypt, having the harem principles to contend with. It is impossible to institute an external maternity charity for male medical students. The only practice that our students get in obstetrics is in the hospital where, with great difficulty, we manage to persuade certain women to come for their confinements. This, however, has only resulted from twenty years of unremitting labor on the part of Dr. Dobbin. The net result, however, of the unfortunate prejudice against male doctors in the harem, is that we get a large number of cases of ruptured uteri and similar complications. There was no obstetric teaching in Egypt thirty years ago, when this school was revived; nor does there appear to have been any obstetric teaching since the beginning of the Moslem era, A.D. 700. As far as we can gather from a study of the mummies and of the medical papyri of dynastic

Egypt (dating to 3000 B.C.) the practice of obstetrics was deplorable. We have some mummies, even of royal families, in which death had evidently taken place in childbirth and no attempt made by cesarean section or other means to relieve these cases of obstructed labor. The harem principle, however, shows signs at last of giving way before the progress of Egypt in other directions, since the King showed the example of having English nurses and doctors for the Queen's babies."

From Buenos Aires Dr. Frank R. Pasman is authority for the statement that obstetrics shares equally with general surgery in teaching hours. The buildings and equipment of the Maternity Institute at Buenos Aires are unexcelled.

Professor Alberto Ramos of Buenos Aires is an ardent champion of the combination of obstetrics and gynecology in teaching institutions and in practice. The obstetricians of South America are waging the age-long conflict with the midwife and the general surgeon and it is gratifying to note that astonishing progress has been made in the development of modern maternities and well-organized departments of obstetrics and gynecology. Professor Ramos says, however, that their students are not sufficiently instructed in obstetrics; that the knowledge of the student at the time of graduation is no more than mediocre and their technical capacity almost nil. He is far from being capable and self-reliant for want of practical clinical experience. Indeed he is not sufficiently trained to appreciate his limitations. No less than three months of maternity service would reasonably equip the student for the responsibilities of a general practice says Dr. Ramos. In the Argentine the doctor is rapidly replacing the midwife in practice and is encouraged to refer his cases of dystocia to maternity clinics, for the dual purpose of better service to his patient and added instruction for himself.

In Sweden clinical obstetrics was introduced by Johan von Hoorn in 1662, but was not required as part of the curriculum until a century later. Essen Moller tells us that "Instruction did not attain its full efficiency until the year 1851." The students in the University of Lund devote four months to clinical obstetrics, living and breathing the atmosphere of the clinic. Each student will have personally conducted an average number of 38 to 40 labors, 1 to 2 forceps, and 1 to 2 abortions. Some will have performed versions, manual delivery of the placenta and like maneuvers. "It is significant," says Essen Moller, "that, though there have been many changes in the curriculum of the university, no alteration has been made in the time-honored arrangement of the obstetric and gynecologic teaching." This he ascribes to the practical work under the teachers' control and the fact that the students develop self-reliance and a sense of responsibility.

Stockholm presents one of the most comprehensive systems for the teaching of obstetrics. Nowhere in the world does it appear that the student is given greater opportunities for practical instruction. Here the first obstetric clinic was established in Sweden by Johan von Hoorn in 1662.

Professor Kr. Brandt of Oslo, Norway, reports double the time allotted to general surgery as to obstetrics and gynecology combined. He opines that the combined chairs of obstetrics and gynecology is the only right policy and adds that this policy is pursued throughout Finland, Germany, and Austria and is fast becoming so in France and Great Britain.

Professor S. A. Gammeltoft of Copenhagen expresses the opinion that "our teaching (Denmark) regarding the theoretical side is full up to date, but the practical side ought to be better; one month's practical work is not enough."

Professor D'Rossier of Lausanne, Switzerland, writes that obstetrics has almost the same number of hours as has surgery and internal medicine.

Professor P. C. T. Van der Hoeven of Leiden, Holland, is now devoting double the time to the teaching of obstetrics as was given forty years ago, but general surgery still holds nearly double the number of teaching hours.

Professor Cesare Decio of the University of Sienna, Italy, writes that "In the medical schools of Italy generally the teaching of obstetrics is given about the same time as is surgery, the proportion being 5 to 6. The teaching of obstetrics began in this institution in 1762 with Jacopo Bartolomei as head of the Department of Obstetrics, Anatomy and Surgery and the surgeon remained in control of obstetrics until 1859."

Professor Henri Vignes of Paris writes: "The French system of teaching is not bad in spite of all criticism to the contrary. The privileges we grant our students are excellent. Our great surgeons and doctors are neither inferior nor superior to those of foreign lands. Our courses are long and numerous. For example one begins his studies at eighteen years of age, is an *externe* at twenty, an *interne* at twenty-three, a doctor at twenty-seven, chief of staff at twenty-nine to thirty, hospital doctor without service at thirty-three. He completes his training at thirty-five, may obtain a service by forty-one and may, but may not, become a professor at fifty to fifty-five, 'long after the flame of youth is extinct.' There are 5000 students in Paris and it becomes necessary to give many of the students their clinical training outside the University clinic. This need is supplied by eleven or twelve hospitals in Paris, where lectures and demonstrations are given every morning throughout the academic year of nine months. Here surgery is allotted double the hours as obstetrics. One or more times each week the student passes the day or night in the maternity wards. The theory is acquired from books and conferences. These are for the purpose of preparing the student for his examinations rather than for the practice of medicine."

Professor A. Martin of Berlin says: "It is very meritorious that you are giving this subject consideration in your Association. Obstetrics even today is not given the recognition in Germany that we instructors desire; this from the viewpoint of teacher and practitioner. We are not unmindful of the great difficulties involved in arranging a satisfactory curriculum for the study of medicine, due to the marvelous development of the medical science. In Germany the student is required to deliver but 4 cases which is manifestly too small a number and we are endeavoring to bring about a change whereby the student will be required to devote one month to the maternity wards and it is expected that this will be done."

Professor L. Fraenkel of Breslau, an honorary member of our Association, writes as follows: "Of late years surgery is encroaching on the field of obstetrics and some of the work formerly considered part of obstetrics is falling into the hands of the surgeons. Slightly more time is allotted to surgery than to gynecology and obstetrics; the proportion being 6 to 5. The ratio of obstetrics to gynecology is about 3 to 2. Besides, we require that every semester the students spend all their hours in the clinic and live there for a certain fixed period. During this time they are present at all deliveries and are instructed by the assistants and permitted to examine the patients. This is in addition to their other lectures and the clinic time devoted to obstetrics and is no longer than for surgery."

Professor Otto von Franke of Bonn finds it difficult to give the exact number of academic hours devoted to the teaching of obstetrics because, as he says, obstetrics is combined with gynecology throughout all Germany; that it always has been and he hopes it always will be. He expresses the criticism that in Germany too much emphasis is placed upon the scientific phases of the subject and not enough on the practical. Obstetrics and gynecology combined share nearly equally with general surgery.

Professor Pankow of Freiburg presents an outline of a very comprehensive schedule in obstetrics and it is apparent that all possible emphasis is placed upon practical clinical instruction. It is of interest, however, to note that a minimum

of 4 deliveries is required of the student, though some students will deliver 20 to 30 cases. Only two to three days are required in the maternity wards. The bulk of the clinical instruction is given in clinics conducted by the head of the department. Professor Pankow says that because of the growing importance of the problem of abortions in Germany, two or three students are required to attend every case. Regret is expressed that the students are not required to personally supervise more deliveries.

Professor H. Eymmer of Innsbruck, says obstetrics in Austria is not on an equality with general surgery in number of teaching hours; about double the time is devoted to surgery.

Dr. Bernhard Aschner of Vienna feels that obstetrics, for the past 100 years, has been placed upon an entirely wrong basis. He argues that the teaching of obstetrics should be simplified and the hours shortened; that too much time is allotted to such subjects as embryology and histology, subjects that are superfluous to the general practitioner and only of interest to the scientific specialist. He says he is aware that the majority of professors in Austria and Germany would not subscribe to this criticism, but contends that his principles have proved themselves in private practice and voices the hope that his American colleagues will share in his views.

Dean Martin of McGill University says: "I feel very strongly that not enough time is given as a rule to obstetrics in most of the schools. Certainly it deserves, in combination with pediatrics, at least as much time as surgery. In our schools we have, I believe, as good an obstetrical service as anywhere in the world for the student body."

Professor W. B. Hendry of Toronto University is "not altogether satisfied with the small amount of time which is detailed to obstetrics in comparison with the number of hours of clinical instruction a student gets in surgery." The proportion, as stated by Doctor Cleland, is 65 lectures in obstetrics; 120 lectures in surgery; 85 clinical hours in obstetrics; 430 clinical hours in surgery.

Dr. J. Clarence Webster, my former chief and now Emeritus Professor of Obstetrics and Gynecology of Rush Medical College, says:

"Very few medical schools in the United States and Canada are in a position to give adequate training in obstetrics to their students. Consequently, in private practice childbed mortality continues to be higher than it should be, and morbid pelvic conditions produced form a large percentage of the diseased conditions from which women suffer.

"Theoretic instruction is excellent in many institutions. The need is for better clinical instruction. This may be obtained in two ways. Teaching Maternities, in which senior students may reside and conduct cases of labor under supervision, as in the famous Dublin Rotunda, are necessary.

"Outdoor district care of obstetric cases, also under supervision, should be provided in all schools. This method of instruction has long been a feature of the Scottish schools, and has been largely responsible for the high standard of practice among their graduates."

Dr. Fred C. Zapffe, Secretary of the Association of American Medical Colleges, writes in a personal communication:

"I am very glad that your Association is taking an interest in the teaching of obstetrics. For a number of years I have been trying to interest other associations in this question, but so far have failed in my efforts.

"As to the teaching of obstetrics: During an experience of twenty-three years of visiting medical schools I have gained certain impressions that have never varied, but have been multiplied.

"As a rule, obstetrics and gynecology are in one department of which a gynecologist is the head, as there are only a few obstetricians, and even if there were more, the gynecologist would insist on the headship of the department, or a separate department. Therefore, the bulk of the hours allotted to the combined department are taken by the gynecologist.

"I find that in many schools there is very inadequate provision made for training students in actual delivery work. There are very few well organized out-patient departments for obstetric teaching and hospital teaching is, with few exception, not adequate obstetric teaching. Students observe; they do not 'do.'

"I have been especially interested in this question because I have always been convinced that the teaching of obstetrics is wholly inadequate in most medical schools. I am convinced that obstetrics should be a separate department, in charge of an obstetrician, and that out-patient maternity work should be the backbone of the teaching. In an editorial published in the *Bulletin* of this Association, July, 1927, I advocated the abolition of the department of surgery in undergraduate medical schools and provision for a department of medicine and a department of obstetrics. In the October, 1927, issue of the *Bulletin* I published a cooperative curriculum in which I gave to obstetrics 140 teaching hours and four weeks of maternity work; more hours than I gave to surgery (didactic) and nearly as many as I gave to medicine (didactic)!

"I am not an obstetrician; I do not teach obstetrics, but I am firmly convinced that undergraduate medical students should have more obstetric experience.

"It is impossible to give to each fundamental subject in the curriculum the time it really should have; but training in fundamentals can be given in comparatively few hours if we stop spoon-feeding our students, attempt to direct, rather than to lead, them, and give them opportunity to do some thinking for themselves.

"It is necessary for every teacher in the medical school to recast his courses; to change his methods of teaching; to stop being didactic; to direct; assist and give to the student a little knowledge which will stick and make it possible for him to get more on his own. On inquiry I have heard it said over and over, that assignment of so many pages of a standard textbook for a quiz or a recitation (the same) is the rule. That is also true of obstetrics. You cannot teach all of obstetrics in an undergraduate course, even if you devoted a whole year to it, but you can teach the very much needed fundamentals and when expert help is needed, and stimulate some students to develop themselves further in that specialty.

"I may be in error, but I feel that what the student needs in obstetrics is more prenatal work; more delivery experience, in addition to training in making obstetric examinations and manikin work, with a very short course in the usual didactics. All rare and unusual things should be taboo. And all of this can be done in 140 hours and four weeks of maternity work.

"You and your associates have my good wishes in your attempt to do something for obstetrics, but, please remember, that there must be two courses of training: One for the undergraduate medical student who must practice obstetrics in the home, on the farm, or in a hospital, and the other for him who wishes to become an expert, a specialist.

"I will be very grateful to you for word as to what action, if any, your Association will take at the September meeting. Further, I want to assure you that I am very much in accord with special societies taking on the job of considering their teaching function; in fact, it is a duty for teachers to do that in their special societies. Heretofore, regard has been had only to the development of the specialty; but, inasmuch as there are not associations of teachers of this and that, nor of all teachers, it behooves the teachers who are members of special societies

representing their branch, to discuss teaching because only in that way can we even hope to solve the problem."

The theoretic teaching of obstetrics in America may be said to be fairly up to the standard set by other nations, but the facilities for clinical observation are woefully lacking in many of our institutions. Herein lies the explanation for the disgraceful showing we are making in the practice of obstetrics as compared with other nations. Baker tells us that the maternal mortality is one-third higher in the United States than in England and Wales and more than twice as high as in Denmark, Italy, Japan, the Netherlands, Sweden, and New Zealand. Dr. Brooke Bland is my authority for the statement that the United States ranks highest in maternal mortality among the 21 leading nations; that we have consistently maintained a rate in excess of six per one thousand from 1915 to the present time. And this from a nation that so blatantly boasts of its efficiency and of the magnitude of its institutions. In this connection we recall the fate of the dinosaur which from an architectural point of view was the largest and most beautiful of animal creations, but its body grew so large and its head so small it could not maintain its existence.

All will agree that the number of clinical maternity beds in most of our teaching hospitals is entirely inadequate for the proper training of students. But there must be more than clinical facilities provided; there must be time for the student to use them; time in which to live in an obstetric atmosphere. This cannot be done without a very radical pruning process on the part of those charged with the responsibility of portioning out the students' time. The curricula of our medical schools and of our premedical institutions are literally jammed with irrelevant subjects which have no bearing whatsoever on the practice of medicine. Far too much emphasis is placed upon clinical subjects which might better be shifted to graduate schools. Indeed, it would seem that between the theorizing of the Ph.D.'s of our faculties and the gormandizing of the general surgeons, the obstetrician has done well to maintain a semblance of individuality.

Permit me to submit to you the following propositions for your consideration:

1. If it is the business of our undergraduate medical schools to prepare students for the general practice of medicine, it follows that obstetrics should have a large place in the curriculum.
2. In the general practice of medicine obstetrics far exceeds that of general surgery in importance and is only second to that of internal medicine. Such should be the relative positions of these subjects in the curricula of our schools.
3. The demand in numbers of academic hours upon our medical students is already excessive and should be reduced. To provide more

time for clinical instruction in obstetrics, without adding to the burden of the student, the didactic teaching in obstetrics, as well as in all clinical subjects, might well be restricted to the fundamentals; much of the teaching in general surgery should be shifted to graduate schools and far less emphasis should be placed upon minor specialties.

4. The need is for more practical instruction in obstetrics and this can only be attained in hospitals and dispensaries. The service in the out-patient department, as commonly conducted in our institutions, is no adequate substitute for the dispensary and the hospital.

5. Not less than one month should be devoted exclusively to a maternity service. In this service the student should deliver a minimum of 20 cases, under the direction of trained clinicians; and the importance of prenatal supervision should be stressed.

6. Everywhere throughout the world it is apparent that the teaching of obstetrics is receiving more and more consideration. The medical schools of the United States are lagging far behind most schools of the world in practical instruction and this for lack of adequate clinical facilities and the time to devote to it. There must be a re-vamping of the entire curricula in our schools to the end that our students may be better prepared to meet the demands of the general practice of medicine.

7. The maternal morbidity and mortality, which in the United States has not decreased in the last fifteen years and is today the highest of the twenty-one leading nations, is chargeable to educational defects and will not be materially reduced until our institutions provide more adequate clinical facilities.

8. From my correspondence (see appended résumé)* I learn that the countries in which part or all of the institutions give obstetrics and gynecology combined, equal recognition with general surgery are Russia, Poland, Ecuador and Argentina; that in Germany, France, Norway, Sweden, Holland, Italy and Switzerland the allotment is nearly equal; while England, Scotland, Wales, Canada, Australia, Egypt, Finland, India, Cuba, Czechoslovakia, Chile, Peru, Brazil, Austria, Hungary, Mexico, China, Siam and Haiti give much more time to surgery than to obstetrics and gynecology, the proportion being about 2 to 1. However, it is of interest to note that in none of these countries is surgery given so large a proportion of the teaching hours as in the United States where the ratio of surgery to obstetrics is in the neighborhood of $4\frac{1}{2}$ to 1.

9. The American Association of Obstetricians, Gynecologists, and Abdominal Surgeons respectfully petition and urge upon those who are in official command of the situation to remedy this state of affairs.

*For lack of space the details of Dr. Findley's questionnaire addressed to deans of medical schools and professors of obstetrics, can only be included in the Association's current volume of transactions and in the author's reprints.

We ask this with no desire to unduly exalt ourselves or our specialty, but for the purpose of preparing our students for the responsibilities of their chosen profession.

And Israel spoke unto Rehoboam saying: "Thy father made our yoke grievous; now therefore, make thou the grievous service of thy fathers, and his heavy yoke which he put upon us, lighter, and we will serve thee."

THE TREATMENT OF CERVICITIS, PARTICULARLY BY THE CAUTERY AND OPERATION*

BY FREDERICK C. HOLDEN, M.D., F.A.C.S., NEW YORK

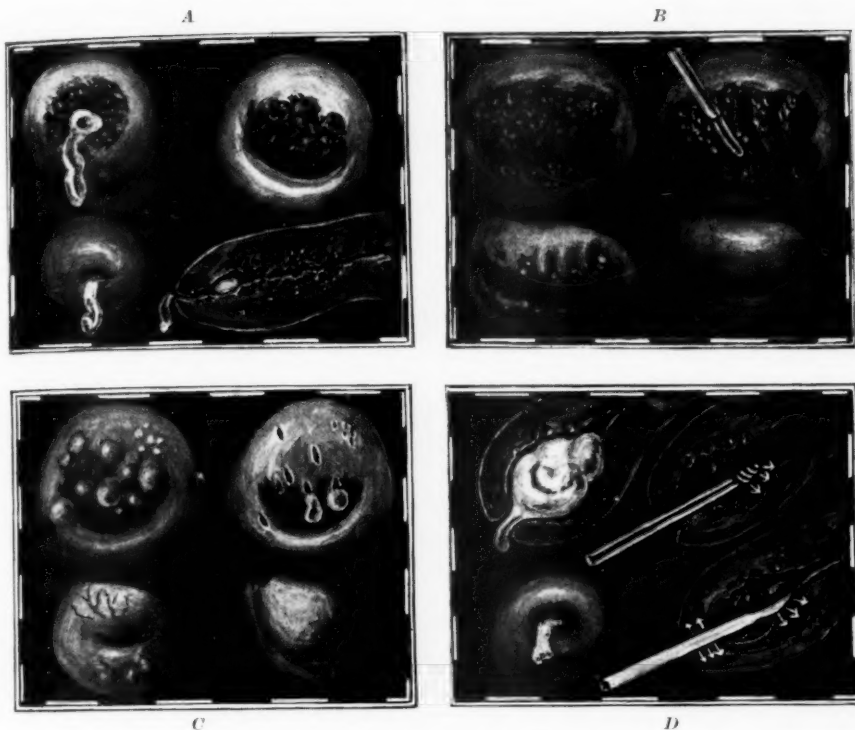
(From Committee on Maternal Health)

THE treatment of the most frequent and persistent of the pelvic infections is a present field of active discussion. An evaluation of the various claims is therefore in order. For such a purpose we may compare the results obtained in a service amply provided with obstinate examples and operative opportunity like Bellevue Hospital with those in an office fully equipped for local treatment. This inquiry is aptly reinforced by items from a special study covering 500 case records among one group of private patients turned over to me by our Committee on Maternal Health.

This paper takes up some clinical issues relating to cervicitis in the groups in which the cautery seems to be particularly indicated; namely, in the virgin, between labors, and at or near the menopause; cervicitis of the cystic variety, the form accompanied by polyps, obstinate gonorrheal infections, and erosion with precancerous suggestion. A new indication is taken up; namely, the healing of the cervix before operation in order to lessen the amount of surgery. The main group, however, comprises those women whose chief pelvic disorder is an uncomplicated inflammation of the vaginal portion and the canal.

The varieties of cervicitis, where the cautery is not indicated or where it is unnecessary, are the following: (1) the considerable group in which the disorder is but one of several, for which operation is called for, as with laceration of the pelvic floor, tumors, or retroversion with symptoms; (2) the relatively slight inflammations, neither granular nor everted; (3) the simple edemas; (4) the few cases found to do better on other treatments after trial of cautery; (5) cervix inflammation in very sensitive or hysterical individuals who are bad subjects for office care; (6) a congenitally long *portio vaginalis*, only curable by amputation; and (7) the uncomplicated cervicitis given to more or less frequent relapse.

*Read before the American Gynecological Society, Washington, April 30th, 1928.



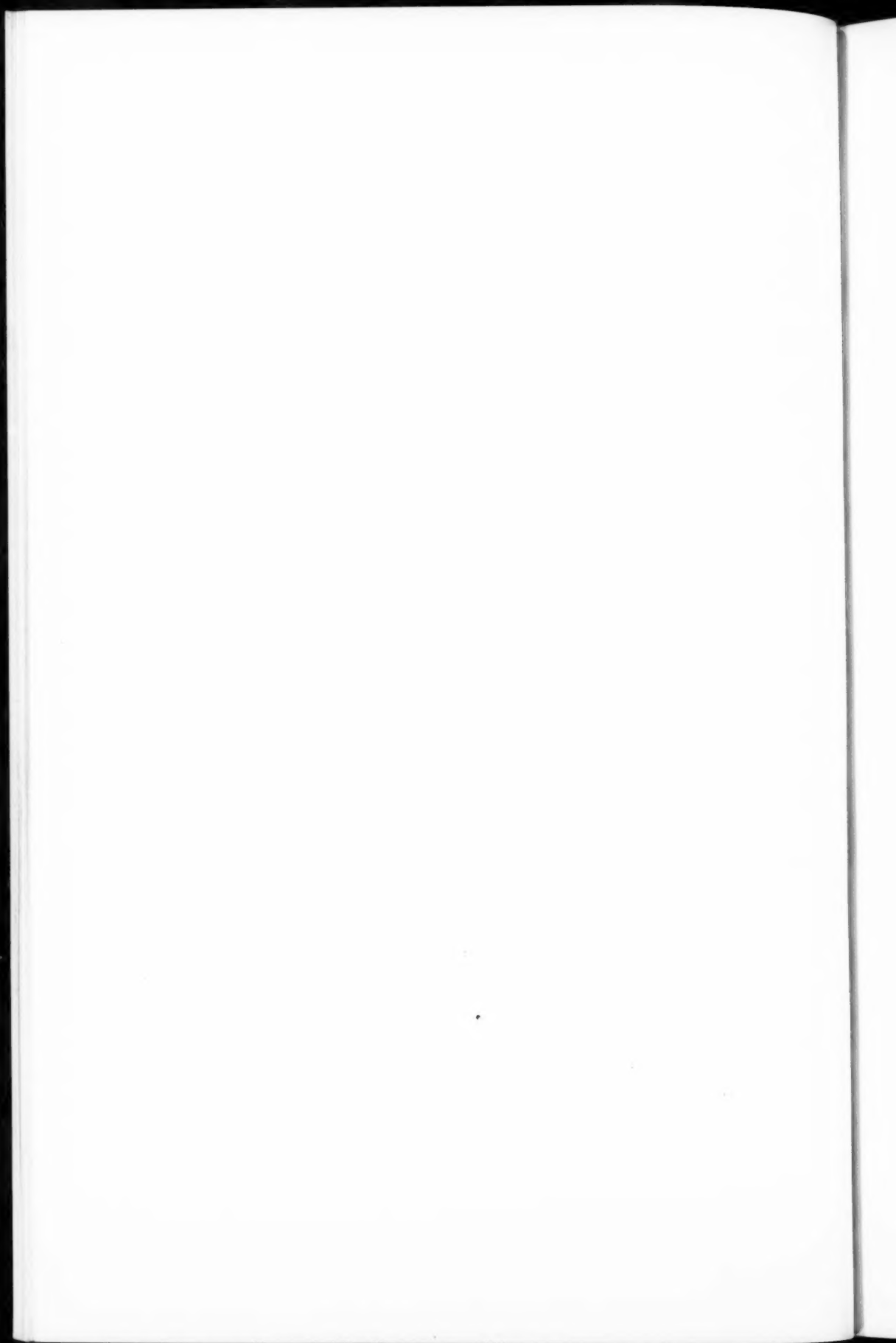
A.—Virginal and Senile Cervicitis. (1) Cervix in an actual virgin, with sharpened-edged, one finger hymen. (2) Cervix of actual virgin with eversion and simulation of laceration. (3) Senile cervix with healthy vaginal portion yet with conditions shown in 4. (4) Multiple cysts high up in canal in woman of seventy-five years (after Christeller).

B.—Steps in Treatment of Cervicitis. (5) Laceration with eversion and raw surfaces apparently calling for operation where surgery is postponed until other babies should be born. (6) The same with cautery treatment by the narrow platinum loop. (7) Condition three weeks later calling for second application. (8) Shrinkage, inversion and healing rendering operation unnecessary; but recurrence after next child called for repetition of treatment.

C.—Cysts, Varicosities and Conical Cervix. (9) Cystic disease of lacerated cervix, with cysts located within canal and on lateral surface of vaginal portion. (10) Cautery opening of the cysts, with clear mucus hanging out of two incisions. (11) Varicosities of cervix on posterior and on anterior lip shown, for convenience, on same cervix. (12) Conical cervix with healthy surface, the cavity blocked with mucus.

D.—Cautery and Dilatation in Cervical Canal. (13) Small external os, high cysts, dilated canal plugged with mucus. (14) Slough protruding from external os a few days after cautery. (15) Nasal cautery treatment of diseased canal; arrows show area being cauterized. External os has had preliminary dilatation. Fine loop or spiral tip of nasal cautery does not burn external os, and thus stenosis is avoided. (16) Same canal as 15 with the Postcautery demonstrated, showing, by arrows, an unavoidable cauterization of external os, producing stricture.

The frame of each cut is laid out in centimeters on the sides and half-inches at top and bottom to show the scale.



I. INDICATIONS FOR THE CAUTERY

Virgins.—In a series of 500 cases of cervicitis in private practice, it was found that one out of five occurred in unmarried women, 85 of this 100 having hymens so small and sharp-edged as to be classed as verifiable virgins. It is a serious matter to undertake a long series of office treatments in single women with an ailment essentially chronic and prone to relapse. If the cautery holds out the promise of substituting 2 to 4 treatments spaced two to three weeks apart for a course of bi-weekly treatments covering two to four months, the cautery claim for this field is well founded. By the former, fewer office habitués will be developed and less erotic stimulation will be aroused. By the use of a virgin speculum and the narrow beam head-light the hymen is undamaged and the nerve strain often associated with local treatment is minimized. (Fig. A, 1, 2.)

Between Labors.—A considerable proportion of parous women present a raw cervix during lactation or thereafter, with leucorrhea and some pelvic discomfort. (Fig. B.) We have learned to realize that one woman in five may have a postpartum retroversion, and we have shouldered the obligation by systematic search for, and treatment of, this disorder. But *routine investigation for a raw cervix after labor* has not yet become a standard responsibility. When such search finds a granular exerted external os with or without laceration and edema, the alternatives of temporizing or repairing face us. The patient desires other children. She is likely to present the same condition of the cervix after each labor. The time when operation gives permanent results is when she is through having her children. Then repair of the cervix will be combined with repair of a pelvic floor and operative correction of any retroversion. In recurrent cervicitis of parous women we have in the cautery therefore a nearly ideal method for healing and inversion with a minimum number of office visits. Such treatment interlocks preferably with the relief of displacement by pessary support.

Goodall drew attention to the puerperal morbidity due to latent infection in uncured cervicitis of pregnancy in a lecture before the New York Obstetrical Society, March 16 of this year.

Senile Cervicitis.—The small vulva and sensitive vagina of the woman beyond the menopause (one who is not having regular coitus) presents some of the same reasons for a thorough but infrequent treatment. If this new field develops as it appears to promise, and cysts within the canal coupled with a narrow external os are the main cause, dilatation of the external os and the fine cautery wire tip in the canal would appear to be the best treatment. Postelimaeteric cases do not comprise over 3 per cent of our list. In these patients the polyp as a cause is never out of our mind. (Fig. A, 3, 4.)

Cysts.—These occur either alone or in conjunction with raw surfaces. (Fig. C.) In cervicitis cysts were found in one case out of four. Of 125 cystic patients 25 were treated between the ages of twenty and thirty, 58 between thirty and forty, 40 between forty and fifty, and 2 between fifty and sixty. Half of the total number were treated between thirty-three and forty-three. The tendency to relapse was marked. The cysts are sometimes left-overs after healing of an eroded cervix, bringing a patient back at intervals of months or years, whenever she recognizes the recurrent ache or dysmenorrhea from their tension. These do not often justify operation in and of themselves because the relapses are of a minor degree, as a rule, once the larger cysts have been eradicated. *Cysts high in the canal* are a new study. Dickinson is finding, since his paper was read in November, 1927, such location to be even more frequent than he supposed. It need only be said here that the high location of some of the large groups of cysts at or even above the internal os would, if removed by the Sturmdorf method, require so extensive a conical excision, and a near-cylinder so large at its upper end, as to constitute a strong argument for a preliminary trial of the electrocautery tip. Whenever other operative measures are necessary a cervix riddled with cysts may well be amputated. There are, however, conditions in which these other operations may need to be deferred. In such cases cysts of the cervix may well be punctured. Then when the time for operation arrives the months that have elapsed with no recurrence of cysts may show that a cervix operation is not needed.

Polyps.—As these growths are conveniently treated by the cautery, application of the hot wire to the inflamed or infected surfaces in the neighborhood is indicated. Two or three weeks later, when using the cervical endoscope to look at the base of the polyp, a second application of the hot wire will be made if required. Bishop believes that malignancy is not infrequent with polyps, but Dickinson found only one such diagnosis in 106 polyps sectioned. Whether there be a large or small danger of cancer in connection with polypoid growths, the indication for treatment by the cautery is very strong as it is the method next to radium in value for ability to limit or prevent malignant growths. Attention should be drawn to the frequency with which polyps occur at and near the menopause.

Chronic Gonorrhea.—Among the private patients upon whom the statistical study is based, there were smears or cultures early in the series. We had the usual experience of discouragement from single smears and repeated smears. In women with clear histories or adequate clinical findings smears were largely abandoned. Vigorous treatment damaged the diagnostic value of smears. We therefore have in this series few cases which are classed as gonorrheal by microscopic tests, only one in ten among the married women. No doubt a

very considerable number even in this private practice had their origin from the gonococcus, but Curtis has shown that the active agent in a long continued inflammation hereabouts is no longer the original offender. In any case we are concerned with the cure of the chronic cervix rather than with the cause. I am convinced that no method of treatment compares with the cautery in relieving the obstinate cases proved or supposed to be gonorrheal in origin.

Naturally the cautery is not used in the acute stage or in persons with tender tubes. I have never seen a salpingitis or peritonitis lighted up or renewed from the use of the cautery within the cervix. However, this may be due to the practice of beginning with a moderate trial treatment to ascertain the patient's reaction to treatment wherever doubt exists. Other measures such as diathermy or tampon are sometimes used first where the main complaints are due to adherent tubes.

Prevention of Cancer.—Since the American Society for the Control of Cancer began to educate the public, more women are coming to the gynecologist to be examined. Cervicitis which is not active enough to produce a leucorrhea or dysmenorrhea or other discomfort is thus brought to our notice, indicating that this chronic and mild disorder may have lasted for years. Simple treatment like silver nitrate or full strength pyroligneous acid will usually suffice, but the cautery is needed for cystic or granular conditions. The new practice of the gynecologist of following up his former obstetric patients or those who have been treated for cervicitis and sending for such as have not been cared for by himself or others, and the healing and keeping healed of the cervix may have an important effect in preventing cancer. In the series studied, a singularly low incidence of malignancy has been shown among the 500 cases. Three unsuspected cancers were detected among the 313 parous women, all being found at repair operations. There have been several cases apparently along the border line where there has been some reason for not operating and obtaining a specimen. Here it is inferred that a thorough-going treatment with the hot wire would destroy any very superficial cancer. It goes without saying that no case with clinical evidence, such as friability or bleeding after sulphate of zinc, escaped biopsy or diagnostic curetting.

Cautery as a Preliminary to Operation.—In certain selected cases, as a deliberate first step, I have opened cysts or healed raw areas, with the purpose of lessening the amount of operative work to be done, postponing the surgery until healing and shrinkage had occurred. Thus one is able to forego one of the series of operations to which the patient would otherwise have been subjected. I was led to do this by the number of instances in which a patient who evidently needed a cervix operation had to postpone such an operation and

was given palliative cautery treatment while awaiting operation. In a surprising number, when the time for Sturmdorf or amputation or repair arrived such an amount of inversion and shrinkage and such sound healing of the surface had occurred that one had no reason for resort to surgery.

Minor Indications.—Large vessels on the surface of the cervix are rare but constitute a definite reason for use of the hot wire. Care is taken to keep the heat very low in order to shrivel and not cut through the vessel. Where the vaginal portion clearly shows projecting veins it is to be presumed that the same condition exists within the canal and cautery treatment along two interior faces is desirable.

The conical cervix is to be watched for because defective drainage and a pinhole os are likely to be associated, and infantilism and sterility are not unusual accompaniments. Any leucorrhœa under these conditions would lead one to suspect blockade. An innocent looking opening may have behind it a cavity as big as the last joint of a man's thumb, distended with tenacious mucus or mucopus. Under such conditions the importance of dilatation cannot be overstated.

II. CONTRAINDICATIONS TO THE CAUTERY

Except as an occasional preliminary I do not use the cautery for the infected or cystic cervix where other operations are needed, as for tumors, tubal disease, retroversion or plasties of the vagina or pelvic floor. Under such conditions the cervical operation is combined with the others. However, if there be no surgery to be done below the cervix, such as repair work, and the cervix can be cured by a couple of treatments, then there is a distinct advantage in healing the cervix by cautery, so that the work in the operating room may be from one point of attack only, the upper or abdominal route.

Simple Forms.—Where the cervix presents only superficial inflammatory or infected processes or where dilatation of the external os is the sole requirement to better the drainage from the canal, cautery is not needed and simple applications like silver nitrate of a strength of 5 to 15 per cent suffice.

Nervous Patients.—There are highly nervous patients unsuited to a treatment which may give pain. The hysterical are ruled out and also the individual on whom novocaine (5 per cent in adrenalin solution) fails to bring about bleaching and local anesthesia. A course of very gentle applications, or operation, may be wiser selections for these individuals. There are a very few instances (1 in 55) which have shown better results with other local treatments. Apart from recurrence due to labor there are a few relapses where removal of the infected area is necessary.

Diathermy.—The merits of this method of treatment of cervicitis have not yet been satisfactorily established. The electrode within the

cervix carries heat up to 116° F. which is said to kill the gonococcus. With a full installation in the office, a year's use has shown some excellent results in the treatment of certain products left after acute pelvic infections, particularly by the relief of pain and removal of exudate. I have not used diathermy for cervicitis because of the satisfactory results achieved with the incandescant wire.

Radium.—Curtis states that he has abandoned radium in the treatment of cervicitis for more than two years because he felt its action was difficult to control and contraction occurred at times. The cost, the exact skill required, and the hospitalization also militate against radium.

III. CAUTERY METHODS

The simplest method is that of Abrams, who heats the tips of a uterine dressing forceps to a cherry red heat in an alcohol flame and applies this to the affected surface. A circular slough up the canal may produce stricture. The most generally adaptable and workmanlike tools have, however, long ago been developed for use by the rhinologists. The delicate narrow platinum loop and the spiral tip nasal electrode provide entirely satisfactory burning surfaces with which to apply heat that can be perfectly regulated.

The only advantage of the Post cautery is that for \$25 it can be attached by its rheostat to any electric light socket, whereas the nasal electric cautery requires a rotary converter as well as rheostat for the direct current, and a rheostat alone for the alternating current, at a cost of \$85 or \$35 respectively for the entire equipment. Wappler has a new device for both light and heavy cautery at \$120. But though the Post cautery works well on surfaces in view, within the canal it has done harm for the following reason. The heat cannot be restricted to the tip where the work is to be done. Unlike the nasal cautery with its insulated shank, the shank of the Post cautery becomes so hot that the external os is burned (Fig. D, 16). The closures of the cervix reported to Dickinson and myself are cases after use of the Post cautery, and the literature has cases from the Hunner treatment with the Paquelin cautery. Cashman, who uses it, systematically has to dilate after cauterization to prevent contraction.

In one series of 168 cases treated by the cautery the interval averaged two weeks. Three or four week intervals may be preferable in a majority of cases. The average number of treatments is two to four. Obstinate infections far up the canal may require more frequent and lighter treatments.

A new study is under way to determine the thickness of the mucous membrane of the cervix in order to learn to what depth the heat of the cautery should penetrate or the amputating or coning process clear away the chronically infected lining. A review of 26 sections

which give some evidence on this point indicates that 5 mm. is not an unusual thickness and that few mucous membranes are less than 2 mm. in depth.

It is better to apply the wire first to the posterior lip, so that the occasional oozing will not fall upon the surface yet to be treated. It is to be noted that the cautery treatment is applied to the external os or deep within the canal on much the same principle as when surgical removal is brought to bear on hemorrhoids. Strips of anal mucous membrane, even though narrow, are left behind in order that stricture shall not develop and in order to provide for rejuvenation of surface epithelium. The tissues intervening between cautery stripes are probably sterilized by the irradiated heat within a radius of 3 to 5 mm. as shown by Polak and Matthews.

Patients are to be warned that some bloody show may occur in a few days and that malodorous leucorrhea will appear, requiring a few days of douching.

IV. POINTS IN DIAGNOSIS

Finally, there are three elements in diagnosis to which attention should be drawn: time, light, and deep search.

First, there should be, as part of one's routine care of a patient, an inspection of the cervix for raw areas or cysts at these occasions: (1) a month or two after delivery, and (2) again at the end of nursing; (3) when a woman is through having children; (4) always in the presence of a leucorrhea; and (5) in the years approaching the menopause.

In the second place, a proper search involves the best possible illumination of the cervix. Except in the gaping vulva or wide introitus accurate visualization of the cervix can only be had by the use of the headlight, and such a headlight as will focus a beam strongly upon it. Dependence upon light from a window or upon the large lamp on the forehead cannot yield proper conditions for adequate attention to all cysts, to the stalks of polyps, nor any exact observation of surfaces and discharges. As with the ear and the throat, the darker the room and the more concentrated the illumination, either from a focusing headlight, or from the lamp within the speculum, the more exact is the work.

Third, for our new studies of the canal we shall probably need to return to the old tubular cervix speculum.

SUMMARY

The electric hot wire eliminates many cervix operations and long courses of local treatment (and the fees consequent) being especially adapted to uncomplicated raw areas, to virginal, senile, polypoid and cystic forms, to obstinate infections and cysts up the canal; to ero-

sions between labors; and to eliminate or to lessen amount of cervix surgery in multiple operations.

Plastic surgery is called for where other operations are needed, for long conical cervix, for obstinate relapses, and where local applications suffice for simpler conditions and edemas.

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59 EAST FIFTY-FOURTH STREET.

(For discussion, see page 710.)

PREMARITAL EXAMINATION AS ROUTINE PREVENTIVE GYNECOLOGY*

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(From Committee on Maternal Health, New York City)

EXAMINATION for fitness has become customary for all occupations save marriage and parenthood. Eventually common sense may be expected to demand a similar preparation before deciding on matters so important to the life of the individual and the race. There should be developed a public opinion in favor of routine consultation on major physical defects and psychic inhibitions before the announcement of an engagement, followed by a general and local examination of both bride and groom a month or more before the wedding day is fixed. At the present time we may at least formulate plans for such a practice, and this formulation should be one of the basic concerns of an independent research body like the Committee on Maternal Health, whose major function is to investigate and report upon the relatively neglected medical aspects of human fertility.

While not omitting reference to legislation regarding examination before marriage, and prescribed forms of certificate, we purpose here to urge upon the medical profession its obligation to assume a social attitude toward those aspects of marriage which are within its province. Responsibility for the sound growth of public opinion rests finally upon the technician. It is he who must work out sane tests and develop the details of useful instruction as the foundation for beliefs which shall be built into the customs of the people.

*From a paper read April 30, 1928, before the American Gynecological Society.

For lack of space, certain portions of this paper had to be eliminated, but the complete paper appears in the current volume of the transactions of the American Gynecological Society and in the author's reprints.

To this end examples are given of advice to prospective bride and groom looking toward the prevention of fear and painful intercourse, of physical maladjustments and frigidity, and of preventable chronic irritations likely to produce unhappiness in marriage. The physician makes a special point of trying to detect and remove misgivings. His general examination includes search for defects and symptoms of communicable or hereditary diseases, and then study of the woman's genital and pelvic anatomy with reference to marriage and childbearing. Instruction is given regarding conjugal relations, first on the differing psychology of men and women, and second, on certain elementary matters, basic for the newly married, including the wise spacing of children. The man *may* be referred to a urologist for examination and instruction, but on the whole it is found better to have both cared for by a single physician.

The study that follows is built upon the case records of some forty-five years in general gynecologic practice. It grew out of the fact that maladjustments focussed at certain points. These points were gathered together as the basis for a premarital talk. Whenever a patient has said that a certain difficulty might have been prevented "if I had only been told," that item has been included. Secondly, intelligent couples instructed before marriage have been asked to report after some months or years on those sections or details which proved to be useful, and those unessential, in the talks that had been given them. Thus, nearly every clause of the set speeches made separately to the bride and groom has grown out of a need brought to light through some unnecessary, and perhaps grievous, misunderstanding. I have gone out of my way to do this, and made it my practice to give the instruction without a fee. The offer rarely is declined.

I. SOCIAL POLICY

The formulas for permission to marry—problems of family and tribal custom which began before man could write—appear in contemporary history chiefly as books and articles on legal questions and general policy.

There are excellent symposia from a foreign point of view in Senator and Kaminer's "Marriage and Disease," 1904;¹² in "Das ärztliche Heiratszeugnis" in the "Monographien für Frauenkunde und Eugenetik," edited by Max Hirsch, 1921;⁷ and in "L'Examen Medical en Vue du Mariage," 1927, written by a group of European authors, mainly French.^{10, 11} We have a recent American study of certification by F. S. Hall.⁵

Social practice varies both with respect to the degree of government initiative and control, and also as to the sort of guarantees expected. Thus, certain states require a certificate of fitness for marriage.¹⁰ Among these are Sweden (1915), Norway (1919), and Denmark (1922),

which call for a declaration by the couple covering mental trouble, epilepsy, venereal disease, leprosy, consanguinity, previous marriage, and children born out of wedlock. The doctor (released from obligations of professional secrecy) only comes into the picture to register the declaration. Turkey, in a recent law, demands medical examination by a doctor especially designated, and goes so far as to have a seal placed on the wrist of the applicant to prevent the substitution of another individual. In Armenia, examination has been obligatory since 1920. Germany requires both applicants to reveal to each other what communicable diseases they have had, annulment being granted for deception.

As an example of persuasion rather than enforcement, we may cite Holland, where there is a society in favor of prenuptial examination, with forty-one active committees. Examination is not compulsory, but the society's circulars are given out by government bureaus on publication of the banns. Amsterdam has a prenuptial consultation office. So have Brussels and Antwerp. Germany, by the law of 1920, began in 1922 to deliver to applicants for licenses a circular advising medical examination. At least eight marriage-advice stations are in operation, chiefly in public health offices, in Berlin, Hamburg, Dresden, Frankfurt, Magdeburg and Linz. The Berlin Medical Society (1926) endorsed a report drawn up by Max Hirsch condemning obligatory exchange of certificates, but favoring a law to make medical examinations of both sexes compulsory, under any physician, and not by designated experts, with safeguarding of professional confidences.

In Austria elective medical examinations have been in operation since 1922, beginning with an appropriation of 300,000 kronen a year. While only about one hundred persons appeared the first year, twelve hundred are now advised annually, the Krankenkassen carrying certain laboratory costs. Dr. Novaks, active in this matter, informed me in 1926 that these examinations were functioning well. In Italy the proposed Red Cross station at Milan plans such secrecy that the candidates need not even give their names.

In France and Belgium, according to Dr. Georges Schrieber,¹¹ public opinion is resolutely hostile to any constraint in the matter. He urges that such examinations should enter into custom before going into code. He favors, first, government distribution of notices to all candidates for marriage, and second, opening stations for advice in the largest possible number of cities, either as a municipal charge or under private auspices. In England, the president of the Eugenics Society, Major Darwin, thinks one should not attempt to go further than to demand from each party the declaration of a belief that he or she is free from certain specified infectious diseases and has never been confined in an asylum or prison, but advocates that marriage of a certified lunatic or anyone mentally defective be made punishable.

The general trend of the recent discussion which has been active in Germany, France and England has been in favor of awakening the public conscience rather than attempting to write laws. The purpose, says Hirsch, is not to crystallize a decision concerning forms of prohibition or permits, but to encourage the "nupturients" to face the health issue as frankly as they would questions of income and social standing.⁷

II. PHYSICAL EXAMINATION

The contribution to sex hygiene made by the physician, and especially the gynecologist, is directed particularly toward the prevention of dyspareunia, vaginismus, frigidity, abortion, sterility, unwise postponement of childbearing, and difficult labor, and the lessening, so far as lies in his power, of the causes of divorce and adultery.

General.—The patient's history indicates where the emphasis should be placed in each particular case. With a neurotic family or personal history, especial attention will be given to the nervous system; with a tubercular or cardiac heritage or symptoms, these possibilities will be stressed. Endocrine imbalance will be considered. The standard tests to be made in these lines, as for gonorrhea and syphilis, have been adequately covered in the books already referred to, and need not be repeated here. The psychic factors are considered at some length in the chapter on dyspareunia, in the volume on gynecology and obstetrics of Nelson's Loose-Leaf Surgery, now in press.

After the ordinary general examination—weight, blood pressure, heart and lungs—the patient prepares herself for pelvic examination by removing the girdle and emptying the bladder.

While making the chest examination, attention should be given to the breast and nipple. Then follow abdominal palpation and external measurement of the pelvis ending with the transverse diameter of the outlet.

Pelvis.—Those who hesitate to examine the unmarried woman are reminded that all information desired about position and size of uterus and ovaries is obtainable by rectoabdominal bimanual palpation, and that a Sims speculum need be no larger than one finger, provided a narrow beam of light is used to inspect the cervix in cases of leucorrhea or dysmenorrhea.

Anatomic observations as to the funnel of entry, the hymen, the vagina, the meatus, and the reaction of the pelvic floor muscle group, are made as a routine after considering the adequacy of menstruation and the sufficiency of external pelvic dimensions. The possible abnormal conditions to be borne in mind are: absence of uterus and vagina; retroversion, anteversion, and particularly infantilism of internal and external genital organs; ovarian tumors, myomas, and their size and location; infected urethral glands and eroded cervix; and the after-effects of any operation or delivery.

An ovarian tumor would call for operation before marriage. Small fibroids might only hamper fertility. Firmly adherent tubes would indicate present and probably future sterility, but Strassmann warns against too definite prophesies of sterility from moderately defective menstruation, antelexion, infantilism and fibroids.¹³

In sterility tests, the male presents a simpler problem. One puts up to the man very directly whether he will prove his fertility or not by a self-produced friction specimen for immediate microscopic test. While active, well formed, full sized sperms show the strongest evidence of fertility, scanty numbers, smallness and sluggish actions may be due merely to fatigue or recent emissions. With such findings, one or perhaps several further tests are made before a statement is included regarding fertility.

There are no data showing the range of genital proportions in either sex, and there is no indication that these variations are often so extreme as to simulate the abnormal. While it is generally stated in the anatomies that there is a marked variation in the diameter and length of the erect male organ, search has failed to reveal a published table based on a series of measurements. Distensibilities of vulva and vagina have already been charted;⁴ their measurements and conformation in the living will be published later.

Introitus.—There are a number of married women in my series in whom impending coitus calls up persistent memories of early painful experience. In order to prevent pain with the first coitus, and its permanent psychic effects, the hymen is to be studied. A hymen about one finger in size with an edge that gives a definite sensation of sharpness to the finger, with an evident sensitiveness on the part of the patient, denotes verifiable virginity and what Strassmann calls "anatomical virtue."¹³

With a hymen of the usual build, thin and admitting one or more joints of the ordinary male forefinger, a very moderate course of douching and stretching will cause it to become elastic enough to prevent pain with the first coitus.

The hot douche every night for ten or fourteen days will relieve tenderness, and daily or so for a month, will produce sufficient relaxation to admit the phallus without tearing, particularly if desire is fully aroused, with its consequent relaxation and self-lubrication. There are virgin hymens torn by ungentle office treatments. There are untorn hymens that have been extended by the use of the douche or speculum, or that have been gradually stretched, either through manipulation by the fingers or entry by the male (more especially by the fiancé), and in a few instances untorn, unnicked hymens have been seen which are distensible to any degree, even to the passage of the whole hand. This distensibility has been touched upon elsewhere.⁴ Such findings will modify our instructions.

There is distinct value in a degree of distensibility which does away with inhibition or fear. Certain patients with hymens that promised to yield to stretching and yet were markedly sensitive, have been asked to try, shortly before the marriage, self-stretching of the hymen with one or more test tubes, or with one, then two, then three lubricated fingers. This dilatation, as well as the douche nozzle, does away with the kind of nervous apprehension that may end in vaginismus in a young woman whose hymen has never been penetrated. The considerable evidence in these records showing extreme distensibility of the unnicked hymen subjected to gradual digital massage by the girl herself or by a woman friend (up to diameters of 9 cm. or 3.5 in.) shows that nothing is more effective in overcoming sensitiveness or to prevent tearing. Whether this self stretching has an implication of impropriety which would make it more undesirable than dyspareunia, is a question to consider.

The *thick* hymen with small opening is likely to be inelastic. As a rule it should be cut, under a local anesthetic, ten days or so before the marriage, so that the cut surfaces will have a chance to heal over. This is particularly necessary where the fossa is deep. My own series shows nineteen women still virgin after one to twenty years of marriage, one wife in about 250. In seven of these virgin wives, the redness and depth of the fossa demonstrated that the glans penis was sidetracked into this pocket.*

Funnel of Entry.—Infantilism presents the most poorly developed funnel and obesity the deepest. Women otherwise well developed may have tiny genitals; such defective development, more than any other finding, calls for douching and stretching. Finally, the prepuce is drawn back to note adhesions or smegma, and if necessary, should be freed with a small probe.

Much has been written concerning the location of the vulva, either forward and accessible, or to the rear and out of reach, and fanciful comparisons have been made in this regard between animals and primitive peoples.⁵ My search among 50 anatomic midsections and on living women discloses no such grouping; on the contrary, the introitus maintains a singularly stable position in relation to the pubic arch. It is all a question of spinal curve and pelvic tilt; that is, the outlet of the bony pelvis, by its slant in one direction or another, determines vulvar accessibility and any apparent backward or forward placing.

Vagina.—A series of measurements and drawings of 160 vaginas in our records fall into the well-known classifications. Besides (1) the average, these are chiefly, (2) the infantile vagina, (3) the short va-

*It is known that an adult male wedded to a young girl, as sometimes happens in India or Persia, may in rare instances drive on in this direction and create a false passage so that he enters the rectum through the perineal body ^{6, 7}.

gina of retroversion, (4) the long vagina of anteversion, (5) the subinvolted, and (6) the relaxed or distended. In retroversion the glans may pass into the lateral fornix and find ample room. The size and position of the uterus at the premarital examination, therefore, give useful information concerning this passage. Warning should be given, in case of displacement or flexion, of the possible need of treatment should coitus continue to produce discomfort, and especially deep discomfort.

Among 140 cases of dyspareunia, a vaginal meatus has been found seven times as a cause. On drawing the vulva apart in these cases, the urethra is seen to converge with the vagina, with little or no distance between the vaginal opening and the meatus proper, or else actual location on the anterior vaginal wall. Such a meatus may be pushed inward and get caught between the penis and the sharp lower edge of the subpubic ligament. When this is recognized before marriage, it may be suggested to the groom that either rear entry or the dorsal posture with flexed thighs—that is, with the woman's knees up towards her shoulders—will keep the meatus from being nipped. This abnormality is to be distinguished from inflamed meatus, which also causes painful intercourse, and of which the same series of cases provides five instances; this is in addition to caruncle, an occasional cause belonging to a later age.

Vaginismus.—Within the hymen is the second possible barrier to the entrance of the male. Spasm seems to affect the pelvic floor muscles as a group rather than any particular muscle or set of muscles. As the pubococcygeus section of the levator constitutes the largest muscular entity, it is convenient to designate all of the muscles that take part in vaginismus as the levator group.* The examining finger, having passed the hymen, finds on the posterior vaginal wall muscular obstruction in an inch-wide transverse band with two thickened edges. If not palpable, the request to the patient to obstruct the entrance of the finger will usually make it so. Only when the muscle groups go into spasm during examination need vaginismus be feared. Under such conditions, the patient may have to be treated from the point of view of her general state, her inhibitions or her local sensitiveness. I have never seen any need before marriage of incision of the muscles. If it is done, the cut should be made like a subcutaneous tenotomy, with a narrow, thin-bladed bistoury. Vaginismus is preventable. Removal of apprehension, prevention of pain, adequate rousing of desire, and self-dilatation can be relied upon to do away with spasm, except in rare cases of this relatively rare disorder. In the future its presence will be evidence of neglect of preventive measures.

*Details of anatomy in vaginismus, with sections and clinical measurements too long for inclusion in a preliminary paper, will be presented in a future study. Twenty-five drawings will appear in a forthcoming volume of Nelson's Loose-Leaf Surgery.

III. INSTRUCTIONS TO THE WOMAN

For the woman, three kinds of instruction mainly are needed: first, the rational preparation for a freer life through the allaying of fears and release of inhibitions; second, the assurance that her responses can be as full and satisfactory as her husband's; and third, removal of the fear of becoming pregnant at a time when it would be a risk to health or happiness, by instruction in conception control.

The first discussion may well precede the physical examination.

In a gynecologic examination, the evidence of the vulva yields an important clue to the type of instruction to be given the patient and the husband. Free mucus secretion is a good augury for sexual responsiveness. Hypertrophies of the labia minora and their degree of cockscorn corrugation indicate the extent of autoerotism, which, if not too set as a habit, also augurs well for proper response. Atrophied folds of former enlargement show capacity long antecedent, now, perhaps, in abeyance.

There is sometimes apprehension that early habits, such as autoerotism, may have set up mental balks or brought about incapacity for normal response. It is therefore desirable to state without questioning that the average or normal experiences of autoerotism or self-relief have rarely done any harm or hindered the happiness to come.

Whatever may be said to the man about the danger of quick emission can be paralleled to the woman about the danger of frigidity, and all the instructions to him about suiting his initiative to her psychology can be matched by urging her to cultivate responsiveness.

IV. INSTRUCTIONS TO THE MAN

Quick Emission.—I believe it is best to tell him quite definitely the fact as shown in my 1000 sex histories; i.e., that no single maladjustment is so frequently found as quick emission in the male, associated with, and perhaps the main cause of, frigidity in the female. In the beginning he should consider a quick emission as not unnatural. Impotence or instant ejaculation may result from nervousness. This, however, should come right later. If it does not, he is to treat his trouble as important, in the sense that the future, as regards successful intercourse, depends upon it. If he can remain only two or three minutes in the vagina, and in this brief period his wife cannot be brought to the climax through proper preliminaries or genital caresses, he must consider his shortcoming serious enough to demand examination and treatment. I have seen the condition cured by relieving irritability in the posterior urethra—particularly at the verumontanum. This is a matter for diagnosis and treatment by the urologist.

Adapting Initiative to Wife's Psychology.—A woman of refinement, unless she is swept away by passion, requires or desires certain pre-

liminaries. Her zones are three: the mental, the surface erogenous area, and the vaginal; while his interest quickly concentrates at the latter. The mental zone is stimulated by loving words and an atmosphere of tenderness. The second zone calls for the kiss or deep kiss, the breast caress or nipple excitation, and the vulvar contacts. The third, or vaginal, zone may not become aroused until she has passed through the two preliminary phases of feeling. It is therefore essential that the man should understand the need for special attention to these zones, and specially to the clitoris and other parts of the vulva, during the early weeks and months, in order that adequate stimulation and complete climax may be effected.

Orgasm.—It is important also that the couple have clearly in mind the difference between excitement or passionate desire and climax or orgasm. There is in women no such dramatic evidence of the latter as in men, with whom the emission and subsidence of erection give proof of completion. She may also require two or three minor orgasms to his one, to discharge the battery, and to this possibility his attention should be drawn.

V. INSTRUCTION TO MAN AND WOMAN

1. *Coitus.*—Dr. Katherine B. Davis, in her study of one thousand American women, 87 per cent of whom reported themselves unequivocally happily married, finds a significant difference in the degree of marital happiness between couples who had been instructed before marriage and those who had not.²

Frequency.—As to frequency of coitus, the only rule is that developed by individual trial. One may state that, after the greater frequency of the first few weeks or months, the average is once or twice a week. The Davis² and Pearl³ studies covering 1,600 couples agree that 10 per cent of the married desire coitus once a day or oftener, even after years of marriage, and there is a corresponding lower extreme. Somewhere along this scale is a cycle which conduces to happiness and health for the majority.

2. *Control of Conception.*—My habit has been to consider every couple at marriage entitled to full instruction concerning methods of birth control as part of the standard knowledge necessary for wholesome married life. I find few couples who marry without planning to have children, and I do not forget the strong argument put up by some of my friends in favor of giving such instruction only after the first child has been born: but I cannot see why the date of arrival of any child should be left to chance. The spacing of children alone is sufficient argument for informing patients concerning contraceptive methods. There were prohibitions by some older authorities against the marriage of persons who should not reproduce because of grave danger to mother and child, as in cases of chronic nephritis, or to the

community, as in cases of mental instability. But since birth control and sterilization have become effective, public opinion no longer condemns to celibacy men and women who can find happiness and spiritual development in marriage, even though childless.

Our chief concern in control of conception is to gain the maximum felicity and permanence for every day marriage. The main argument on this score is the wisdom of allowing for physical adjustments, such as settling into a new home, or the mental adjustments that must occur with every mating. No young wife should be subjected to the strains of pregnancy following immediately upon the exhausting process of wedding preparations and ceremony. Nor does it make for happy early adjustment to have the wedding trip or settling into a new home accompanied by the not infrequent nausea and irritability of early gestation.

I am yet to be convinced that there is any danger of sterility resulting from using contraceptive methods in the earlier months or years of marriage. In this connection, however, I warn the couple against the intrauterine stem and against leaving the vaginal occlusive pessary in for days or weeks at a time. I do not omit to warn couples whom I suspect may be selfish or may too long postpone the first child, of the danger of such a practice. I warn them also of the care necessary in early pregnancy lest abortion should occur.

SUMMARY

Based on a long series of patients' histories and decades of premarital instruction, this study considers preventable maladjustments, such as inhibitions that result in frigidity and details of anatomic findings that produce pain in coitus, and vaginismus. It urges the profession to develop systematic methods to forestall such troubles. Medical advice on major problems before engagements are announced, and complete examination before wedding days are fixed, should come through custom rather than by compulsory laws.

The clear-cut duty of the doctor is positive. His job is to forestall trouble, and to seek occasions for forestalling trouble.

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(For discussion, see page 721.)

THE SURGICAL TREATMENT OF STERILITY WITH PARTICULAR REFERENCE TO SALPINGOSTOMY*

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OF THE various causes of sterility in the female, which are amenable to surgical treatment, this paper will deal exclusively with tubal occlusion. In 1885, A. Martin, of Berlin, was the first to conceive the idea of incising the closed fimbriated end of the tubes and thereby make conception possible in an otherwise incurable condition. The operation never became popular, and reports of subsequent conceptions were published only very sporadically. When Gellhorn¹ presented the subject to this society in 1911 and reported a case of childbirth following salpingostomy, he could collect but thirteen other cases from the literature of the world.

At that time the attitude of American gynecologists toward plastic operations on the tubes was rather unresponsive, and J. G. Clark² probably voiced the general opinion when he stated that "conservative surgery has a very limited field. The only cases in which a salpingostomy is ever justifiable, is in old nonactive hydrosalpinx. The end-results of salpingostomies are disappointing. Pregnancy rarely takes place, as the newly formed ostia quickly becomes occluded and cause a recurrence of the symptoms."

More recently, however, interest in the operation has been revived as evidenced by a growing number of publications in the German, English, and French literature. This renaissance of salpingostomy is attributable, to a great extent, to the insufflation test of Rubin who has taught us that the large majority of tubal occlusions occurs at the fimbriated end. An attempt, then, at removing this obstruction by means of salpingostomy and restoring the blocked passage is, logically, the practical application of the test. The cure of sterility is one of the burning questions of the day, and the subject of salpingostomy and pregnancy is of such great importance that it seems justifiable to present it once more for consideration.

From 1904 to 1927 we performed the operation in fifty cases. With

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the exception of the last few, we carried out salpingostomy only incidentally when, in the course of a laparotomy undertaken for other reasons, we found the tubes occluded. The primary indications were ectopic pregnancy, appendicitis, retroflexion, postoperative adhesions, old inflammatory processes, etc. In thirty-nine cases, one tube was removed at this time, or had been removed at some previous operation, and salpingostomy was performed on the remaining tube. A bilateral salpingostomy was done in eleven cases.

Of our fifty patients, we have been unable to trace twenty-two. Anyone familiar with conditions in large public hospitals appreciates the difficulties of keeping track of the floating population. The remaining twenty-eight patients, of whom we have records to date, belong largely to the private clientele of Dr. Gellhorn and myself; and I take this occasion to thank Dr. Gellhorn for the privilege of using his data.

Of these twenty-eight women, seven have conceived subsequently, which corresponds to 25 per cent. In comparing this percentage with the results recorded in literature, we find that Fuchs³ and Ritter⁴ obtained conceptions in 6 per cent, Unterberger⁵ in 8.8 per cent, Seitz⁶ in 9 per cent, and Solomons⁷ in 39 per cent.

Our results are even more encouraging if the final outcome is considered. One patient had a repeated ectopic pregnancy in the reconstructed tube. Another first aborted and, later, gave birth to living twins. One woman had two living children, three had one child each, and one is, at present writing, in the fifth month of a normal pregnancy. This gives a total of seven living children with the probable addition of an eighth child, a result which, to my mind, fully justifies our efforts, for without them these women would never have enjoyed the happiness of motherhood. It is hardly necessary to point out that sterility is not merely a disappointment to the thwarted maternal instinct, but often a veritable disaster with very serious consequences, and that for this reason even a comparatively few successful cases constitute an important achievement.

Moreover, we rather confidently expect conception to occur in several of our patients who have been operated upon within the last year or two. Their tubes have remained open, as demonstrated by repeated Rubin tests; their objective and subjective conditions are excellent; and their husbands have healthy spermatozoa. There is, at times, a considerable interval between operation and conception. In one of our cases, it lasted seven years; and Isbruch⁸ recorded a conception as many as fifteen years after salpingostomy.

Our cases, then, and those of other operators have refuted the former pessimism toward the value of salpingostomy. It has, however, been argued that even when this operation is followed by conception, the pregnancy is likely to be abnormal; this refers in particular to a

number of abortions and repeated ectopic pregnancies recorded in literature. Our own material does not bear out these criticisms. Only one of our patients aborted, but later gave birth to healthy children. Where, in the available statistics, the frequency of abortion was conspicuous, we may well assume that the same inflammatory cause which had led to an occlusion of the tube, was still operative in the endometrium and prevented the undisturbed growth of the ovum. The abortion, therefore, cannot be laid at the door of the operation, but must be ascribed to failure of treating the underlying etiology in both uterus and tubes, in other words, to a fault in technic which will be discussed later.

Richard R. Smith, years ago, showed in this society that there is a tendency for an ectopic gestation to reoccur in the other tube. We had one such case in our series, and Wesenberg,⁹ Paucot,¹⁰ and others have made similar observations. But such a repetition of ectopic pregnancy is, after all, only a possibility, not a probability; and if one operated on a young childless woman for an ectopic, and found the other tube closed, one would surely give her the benefit of the doubt and reopen this tube. We did this in one of our cases, and the patient later went through a normal pregnancy. Gellhorn¹ considers salpingostomy particularly promising when operating on the other tube for ectopic gestation, and his views are shared by Rosenstein,¹¹ Kehrer,¹² Mayer,¹³ Asch¹⁴ and others.

We are now confronted with this situation. Tubal occlusion is an absolute bar to conception. Salpingostomy is positively the only means of overcoming this obstacle. Conception, however, occurs only in a small percentage of the cases. What can we do to improve our results?

The answer to this question includes two factors; namely, first the proper selection of cases; second, an appropriate technic.

The proper selection of cases demands careful preoperative study and rests on the following points:

1. The husband must be found in perfect condition for procreation. This self-evident premise was frequently overlooked as long as salpingostomies were performed only secondarily in the course of a laparotomy.

2. The patient herself should be at an age favorable for conception and childbearing, preferably not beyond thirty-five years. Two of our patients were thirty-eight and forty-two years old, respectively, and their ages may have been responsible for the failure of the operations.

3. Cases of infantilism or of other dysfunction of the ductless glands should be excluded, because we know that in these, conception is not likely to occur.

4. Cases of acute inflammation of the tubes whether of gonorrheal, postabortal or puerperal origin, are unsuited for the operation. Prochownik¹⁵ opened the occluded tubes in six cases of very acute salpingitis and, strangely enough, obtained success in two of them. Quite recently, Bourne¹⁶ reported seventeen cases of salpingostomy for acute salpingitis without subsequent pregnancies. All other writers consider operations in the acute stage as useless and dangerous.

5. Of the chronic infections, tuberculosis of the tubes should be treated by radical removal. In other chronic inflammatory conditions salpingostomy should be performed only after careful preoperative preparation as will be discussed under the head of technic.

6. The most favorable results will be obtained in cases where the occlusion has been produced by factors outside of the tubes, such as appendicitis and ectopic pregnancy.

7. Salpingostomy is, further, indicated in cases of hydrosalpinx of moderate extent if the walls of the tube are still fairly thick, and of hematosalpinx of obscure origin.

The question of technic is of paramount importance. Salpingostomy has absolutely no mortality, and hardly ever have any other ill effects due to the operation itself been noted which have rendered a second operation necessary. Even though the procedure is practically harmless, yet we should approach it only with due caution. The following points demand consideration:

1. Having ascertained by means of the Rubin test that the tubes are occluded, we may inject iodized oil to determine the exact site of the occlusion. This oil has probably no ill effect upon the tubal mucosa, but if during the subsequent salpingostomy some of it runs out, the peritoneum, which is highly sensitive, may be irritated. We have positive proof of this in one case, and Fraenkel¹⁷ recently expressed himself in a similar manner. We, therefore, abstain from the preliminary injection of oil.

2. At the laparotomy, the tube is lifted out of the wound and held with the hand, but not with an instrument. The occlusion is one of two types. In the first type, the fimbriae are invaginated into the lumen of the tube, sucked in, as it were, and held by a constriction of the serosa. This constriction should be stretched gently and bluntly, perhaps with the handle of the knife or the closed Mayo scissors, thus enabling the imprisoned fimbriae to slip outward. In the second type, where all signs of the fimbriae are obliterated, a longitudinal incision of 2 cm. is made into the lumen, the flaps are everted and fastened with four interrupted sutures of catgut No. 00, twenty days, to the serosa of the tube. All bleeding points are ligated with plain catgut No. 00, and great care is taken not to produce any fresh bleeding in sewing on the flaps. Two or three strands of thin catgut are pushed into the lumen of the tube; these strands are about 6 cm. (2 inches) long, and their ends protrude about one half inch out of the newly formed opening. I was pleased to find that Solomons⁷ who seems to have obtained the largest number of successes, uses the same method and ascribes to it his results. Finally, the ovary is brought closer to the outer end of the tube by an approximating suture.

3. After the incision into the tube but before stitching the flaps in place, the patency of the uterine part of the tube should be ascertained by means of

air inflation as advocated by Curtis¹⁸. For this I use a soft rubber ear syringe which fits snugly into the lumen of the tube. Failure to force air through the tube into the uterus does not necessarily mean occlusion at the isthmus. The passage may be closed only temporarily due to congestion of the mucosa, for in one of our cases where this test failed at operation, the patient conceived two years later.

4. In every case, the patency of the new ostium is tested by the Rubin insufflation after operation; the first test is made two weeks after the operation when the patient leaves the hospital, and it is repeated two or three times at bi-weekly or monthly intervals; and if there have been slight elevations of temperatures not readily explained by other causes, dry heat or diathermy are employed systematically during the immediate convalescence.

5. Particular attention is given to preoperative preparation whenever there is a history of findings of a previous inflammation. In such cases all methods of conservative treatment are called into use, such as protein therapy, dry heat, diathermy, protracted hot douches, etc. The persistence of any infectious process is determined by the sedimentation test; and only if after sufficient time, all clinical signs and laboratory tests indicate the disappearance of the infection, is the operation undertaken.

I am very conscious of the fact that salpingostomy which demands such painstaking preparation and such minute refinement of technic has, after all, only a limited field, but within this restricted sphere there is no other remedial measure available, and the good that may come from it is so satisfying and contributes so much to human happiness, that it deserves the consideration and, I hope, the approval of this Society.

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LISTER BUILDING.

(For discussion, see page 735.)

IMMEDIATE AND REMOTE RESULTS IN TWO HUNDRED TWELVE CASES OF PROLAPSE OF THE UTERUS*

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THE gynecologist confronted with the problem of curing a patient afflicted with prolapse of the uterus is influenced by three factors in his choice of operation: first, by the limitations and conditions in the given patient; second, by his familiarity and previous success with particular types of operations; and third, by his desire to improve his results through the utilization of other methods. With this in mind it seemed desirable to analyze the results obtained in the gynecologic department of the Michael Reese Hospital. There is abundant literature on the subject of prolapse of the uterus, but there are not many articles dealing with comparative results of different operations from individual clinics. Among the best of these studies are those by Bullard¹ who analyzed the work of The Woman's Hospital of New York City, Clark² of Philadelphia, and Spalding³ of San Francisco.

Our paper deals with the last 220 consecutive operations for the relief of prolapse of the uterus in 212 patients. A survey of the ages of these patients gives a range of 24 years to 79 years with an average age of 45.8 years. This average is practically identical with the figures given in the literature. An analysis of the figures by decades reveals the fact that while the greatest number of patients applies for relief in the 40-50 or menopausal decade and the second largest number is found in the 30-40 group, the third largest occurred in the 60-70 group. Apparently if patients do not need relief at or before the menopause, they remain free from symptoms until senile atrophy affects the tissues.

AGE INCIDENCE		
<i>Youngest—24</i>	<i>Oldest—79</i>	<i>Average—45.8</i>
Under 30		12
30-40		55
40-50		80
50-60		26
60-70		33
70 and over		6

The patients in this series bore a total of 892 children, an average parity of 4.2. They range from five nulliparae to one para xiv. One hundred and twelve patients, over one-half the total, are found in the para ii, para iii, and para iv groups.

PARITY INCIDENCE			
Nulliparae	5	Para viii	9
Primiparae	16	Para ix	4
Para ii	39	Para x	5
Para iii	44	Para xi	2
Para iv	29	Para xii	3
Para v	25	Para xiii	1
Para vi	21	Para xiv	1
Para vii	8	Average parity	4.2

*Read at the Fifty-third annual meeting of the American Gynecological Society, held in Washington, D. C., April 30-May 2, 1925.

While it would seem from these figures that the frequency of prolapse is not proportional to the frequency of childbirth, this series is not large enough to justify such a conclusion. Moreover, it must be borne in mind that family limitation plays a rôle in decreasing the number of women who have more than four children.

Among the 220 operations in 212 patients, sterilization was done 102 times (46.8 per cent). In 3 patients (1.3 per cent) there had been previous sterilization. Eighty-eight operations (40 per cent) were

STERILIZATION

Sterilized	101,	46.0 per cent
Sterilized previously	3,	1.3 per cent
Postmenopausal	88,	40.0 per cent
Menopausal	12,	5.4 per cent
Conserved	10,	4.6 per cent
Diabetic	2,	0.9 per cent
Incomplete operation	2,	0.9 per cent
Forgotten	2,	0.9 per cent

performed on women who had already passed the menopause. Twelve patients (5.4 per cent) were in the menopause at the time of operation. Two patients (0.9 per cent) were diabetic and though still menstruating were operated for the relief of symptoms without the risk of prolongation incurred by sterilization. In two patients (0.9 per cent) the operative procedure had to be terminated without sterilization because of shock. In twelve patients (5.4 per cent) childbearing was deliberately conserved. These were young women in whom only suspension operations with vaginal plastics or plastics alone were done. One of these subsequently became pregnant and following delivery there was a recurrence of the prolapse. This patient was sterilized at a secondary operation for prolapse. In two, sterilization was forgotten. One was sterilized by deep x-ray therapy before leaving the hospital; the second became pregnant and was delivered by section, at which time she was sterilized.

Symptoms.—Protrusion was the outstanding complaint 129 times (58.6 per cent). In 118 patients (53.6 per cent) discomfort predominated in the form of lower abdominal pain 40 times (18.1 per cent),

SYMPTOMS

Protrusion	129,	58.6 per cent
Discomfort	118,	53.6 per cent
Abd. pain	40,	18.1 per cent
Backache	62,	28.1 per cent
Bearing down	38,	17.3 per cent
Bladder Distress	74,	33.6 per cent
Frequency	66,	30.0 per cent
Dysuria	29,	13.1 per cent
Incontinence	12,	5.4 per cent
Constipation	58,	26.3 per cent
Leucorrhea	19,	8.6 per cent
Dysmenorrhea	7,	3.2 per cent
Menorrhagia	10,	4.5 per cent
Metrorrhagia	10,	4.5 per cent

backache 62 times (28.1 per cent), and bearing down 38 times (17.3 per cent). In 74 patients (33.6 per cent) who had bladder distress, frequency occurred 66 times (30 per cent), dysuria 29 times (13.1 per cent), and incontinence 12 times (5.4 per cent). Constipation was noted in 58 patients (26.3 per cent). Leucorrhœa was a complaint in 19 patients (8.6 per cent). Dysmenorrhœa was present in 7 instances and menorrhagia in 10; the percentage frequencies, omitting the menopausal group, were 5.3 per cent and 7.6 per cent respectively. Metrorrhagia occurred 10 times (4.5 per cent) in the entire group.

Pathology.—First degree prolapse was found in 25 patients (11.4 per cent), second degree prolapse in 73 patients (33.2 per cent), and third degree prolapse in 122 patients (55.4 per cent). For purposes of comparison a standardized classification of prolapse is essential. As previously noted³ this does not exist in the current literature, American or foreign. Action aimed at the clarification of this situation would definitely enhance the value of statistical comparisons in this field. In this paper first degree prolapse is defined as a descent of the uterus in which the cervix reaches the ischial spines; second degree prolapse as a descent of the uterus in which the cervix appears at the vulva, and third degree prolapse as a protrusion of the cervix or corpus uteri through the vulva.

PATHOLOGY		
Prolapse		
First degree	25,	11.4 per cent
Second degree	73,	33.2 per cent
Third degree	122,	55.4 per cent
Cystocele and rectocele	162,	73.6 per cent
Rectocele only	21,	9.5 per cent
Fibroids	20,	9.0 per cent
Fibrosis uteri	6,	2.7 per cent
Cervix	54,	24.5 per cent
Hypertrophy and laceration	44,	20.0 per cent
Erosions	7,	3.2 per cent
Polyp	3,	1.3 per cent
* Miscellaneous		
Ovarian cyst	5	
Ovarian fibroid	1	
Hemorrhoids	5	
Appendicitis	6	
Diabetes	6	
Myocarditis	6	
Marked hypertension	3	
Cystopyelitis	1	
Salpingitis	1	
Tuberculosis abd.	1	
Deep Douglas	3	

There were 162 instances of cystocele and rectocele (73.6 per cent) and 21 (9.5 per cent) of rectocele without cystocele. Fibroids were present in 20 patients (9 per cent) and fibrosis uteri in 6 (2.7 per cent). Pathology of the cervix was found in 54 women (24.5 per cent). Of these, 44 (20 per cent) had hypertrophy or laceration, 7 (3.2 per cent) had cervical ulcerations and 3 (1.3 per cent) cervical polyps. The

remaining associated pathology comprised 5 ovarian cysts, 1 ovarian fibroid, 5 instances of hemorrhoids, 6 of appendicitis, 6 diabetics, 6 with myocarditis, 3 with marked hypertension and one each of cysto-pyelitis, salpingitis, Bartholin cyst, and pelvic tuberculosis. In three patients the operator diagnosed congenitally deep Douglas. If the deep Douglas is a predisposing factor in the development of prolapse of the uterus, the number noted here would seem too small. Either many instances of deep Douglas were overlooked or its significance has been overestimated.

Previous Operations.—Of the 212 patients whose records form the basis of this analysis, 30 had been operated previously for prolapse, 2 of them being operated three times each, a total of thirty-two reoperations. In only 8 instances, however, did the reoperations fall in the period covered by this study. The remaining twenty-four primary operations were done in other institutions or prior to the beginning of this series. It is of interest to note the methods chosen in the presence of a previous failure. There were 9 interposition operations, 6 LeFort vaginal oclusions, 5 Ries fixations, 5 ventrofixations, 4 Murphy extrafascial fixations, and one each ventrosuspension, vaginal hysterectomy and supravaginal hysterectomy with stump fixation. Whether the best surgical treatment for prolapse of the uterus is achieved by the utilization of the uterus or by the sacrifice of the uterus together with fascial reconstruction is still an open debate in the world's literature. In the reoperative procedures just listed, there were only two instances of the removal of the uterus, evidence that preservation of the uterus is considered essential by the gynecologic staff at the Michael Reese Hospital.

Operative Procedures.—The 220 operations were apportioned as follows—91 Watkins interpositions, 28 Ries fixations, 27 ventrofixations, 17 vaginal plastics, 14 Le Fort vaginal oclusions, 14 ventrosuspensions, 13 Murphy extrafascial fixations, 7 vaginal hysterectomies, 5 supravaginal hysterectomies, 2 cervical stump fixations, and 2 Kielland-Wertheim interpositions.

OPERATIVE PROCEDURES

Watkins interposition	91
Ries abdominal fixations	28
Ventrofixations	27
Vaginal plastics	17
LeFort vaginal oclusions	14
Ventrosuspensions	14
Murphy extrafascial fixations	13
Mayo vaginal hysterectomy	7
Supravaginal hysterectomy	5
Cervical stump fixations	2
Kielland-Wertheim interpositions	2

Mouth temperatures of 101° F. were considered morbidity in calculating gross morbidity. Corrected morbidity figures were based on

the presence of recognizable pathology and exclusive of fever without localized pathology.

Interposition.—There were 91 Watkins interposition operations (41 per cent). There was one death (1.1 per cent) in this group. The patient was a sixty-five-year-old para-v with a third degree prolapse and a systolic blood pressure of 164 n. Convalescence was uneventful. On the eighth day the patient suddenly died. Death was apparently due to cerebral embolism, but no autopsy was obtained. The gross morbidity was 55.1 per cent. The corrected morbidity was 12.1 per cent due to infection of the operative field in eleven patients, in one of whom there was a generalized sepsis with recovery. The group of interposition operations summarized here has been reported in detail elsewhere.³ Thirty-nine patients (43 per cent) required catheterization from one to nineteen days. The average hospital stay was 17.2 days.

Ries Fixation.—There were 28 repairs by the Ries fixation method.³ There was one death. The patient was a forty-six-year-old para vi with a third degree prolapse. She died twenty-four hours after operation from hemorrhage and shock. There was a gross morbidity of 35.7 per cent and a corrected morbidity of 10.7 per cent. This latter represents four patients. In one there was a wound infection, in a second, wound infection and gastric dilatation, in the third there was an acute gastric dilatation, and in the fourth there was a bronchopneumonia. Six patients were catheterized for from one to three days, an incidence of 21.4 per cent. The average hospital stay was 22.2 days.

OPERATIVE RESULTS

OPERATIONS	NO.	DEATHS	GROSS	CORRECTED	CATHETERIZ.	AVERAGE HOSP. STAY
			MORBIDITY (PER CENT)	MORBIDITY (PER CENT)		
Interposition	91	1	55.1	12.1	43.0	17.2
Ries fixation	28	1	35.7	10.7	21.4	22.2
Ventrofixation	27	0	44.4	26.0	15.3	21.3
Vaginal plastic	17	0	11.8	11.8	23.5	19.4
Vaginal occlusion	14	0	21.7	7.3	7.3	17.3
Ventrosuspension	14	0	57.1	35.7	21.4	18.4
Extrafascial fixation	13	0	46.0	7.8	23.0	18.7
Vaginal hysterectomy	7	1	43.0	28.6	28.6	19.0
Supravag. hysterectomy	5	0	60.0	20.0	40.0	16.8
Cervical stump fixation	2	0	0			
Kielland interposition	2	1	0			
Total + Averages	220	4—(1.8%)	44.5	15.4	29.5	18.8 days

Ventrofixation.—Twenty-seven patients were operated upon by ventrofixation and vaginal plastics. There was no mortality, a gross morbidity of 44.4 per cent and a corrected morbidity of 26 per cent. There were two abdominal wound infections, three vaginal infections, one rectovaginal fistula, and one instance of shock. Four patients re-

quired catheterization from three to eight days, an incidence of 15.3 per cent, and the average hospital stay in this group was 21.3 days.

Vaginal Plastic.—Vaginal plastic alone was resorted to 17 times, including 7 cervical amputations. There were no deaths. Two patients (11.8 per cent) carried a morbidity. In one this was due to hemorrhage with repeated vaginal packing, perineal infection, pyelitis, resuture, and eventual complete healing. In the other there was hemorrhage, infection and cystitis with a satisfactory outcome. Four patients were catheterized from one to eleven days (23.5 per cent). The average hospital stay was 19.4 days.

LeFort Vaginal Occlusion.—The LeFort vaginal occlusion was done 14 times, without mortality and a gross morbidity of 21.7 per cent. There were two instances of fever and one of postoperative cystitis, a corrected morbidity of 7.3 per cent. Catheterization was necessary in only one patient (7.3 per cent) and the average hospital stay was 17.3 days.

Ventrosuspension.—Of 14 patients, 13 were of the Gilliam type. A vaginal plastic was done in each instance. There was no mortality and the gross morbidity was 57.1 per cent. The corrected morbidity was 35.7 per cent and included two wound infections, with a three-day partial ileus in one, an acute gastric dilatation, a parotid abscess and a postoperative hemorrhage. This occurred on the tenth day. Catheterization was necessary in 3 instances, 21.4 per cent, and the average hospital stay was 18.4 days.

Extrafascial Fixation.—The Murphy extrafascial fixation operation was employed thirteen times without mortality. The gross morbidity was 46 per cent; the corrected morbidity was 7.8 per cent. This was due to an acute gastric dilatation. It was necessary to catheterize three patients from three to seven days, 23 per cent. The average hospital stay was 18.7 days.

Vaginal Hysterectomy.—Among the seven Mayo vaginal hysterectomies there was one death. This was a forty-one-year-old para v with multiple fibroids, a third degree prolapse, and a systolic blood pressure of 220 millimeters. This patient died in twelve hours of acute cardiac dilatation and shock. The gross morbidity figure was 43 per cent and the corrected morbidity was 28.6 per cent, based on one patient who developed parotid abscess and one who developed a postoperative pyelitis. Two patients were catheterized, 28.6 per cent, and the average hospital stay was 19 days.

Supravaginal Hysterectomy.—Supravaginal hysterectomy was done five times without mortality. Three patients had fever and one developed a foul discharge—morbidity of 60 per cent and 20 per cent respectively. Two required catheterization and the average hospital stay was 16.8 days.

Cervical Stump Fixation.—This was done only twice, each patient registering 101° F. once. One required a single catheterization and the hospital stay was 16 days.

Kielland Interposition.—Of the two patients in whom the Kielland-Wertheim interposition operation was performed, one, a sixty-year-old para vii with a third degree prolapse, died of a lobar pneumonia on the eighth day. The other made an uneventful recovery.

REMOTE RESULTS

The end-results in this series were determined by examination in every instance. These examinations were made either by the operator himself or by some other member of the gynecologic staff. All patients were examined for immediate and remote results. Only the records of those women who were reexamined four months or more after operation are included in this analysis of remote results. Of the 220 operations in 212 patients, four resulted in death (1.8 per cent). Of the remaining 216, remote results were obtained in 148 (69 per cent). One hundred twenty-seven (85.8 per cent) were successful, 9 (6.1 per cent) were partially successful, and 12 (8.1 per cent) were failures. The operative end-result was considered only partially successful if a third degree prolapse recurred as a first degree prolapse or if a cystocele or rectocele recurred. Combining the improved and the cured groups, 136 (91.9 per cent) were successful.

Watkins Interposition.—In sixty-four patients in whom the interposition operation was done, the outcome was completely successful in 56 (87.5 per cent), partially successful in three (4.7 per cent), and a failure in five (7.8 per cent). Of these failures there was infection present in two. The remaining three had an uneventful convalescence.

Ries Fixation.—Of 15 patients operated by the Ries fixation method, 12 (80 per cent) were successful, one (6.7 per cent) was partially successful, and two (13.3 per cent) were failures. Of these failures, one was due to infection followed by severe hemorrhage on the twenty-fourth day and the other resulted from wound infection and bronchitis.

Murphy Fixation.—There were twelve Murphy extrafascial fixations, all of which (100 per cent) were successful.

LeFort Operation.—There were ten LeFort vaginal occlusion operations, all of which (100 per cent) were successful.

Ventrosuspension.—Of eleven Gilliam ventrosuspension operations, ten (91 per cent) were successful and one (9 per cent) was a failure. This patient, a thirty-two-year-old para iv with second degree prolapse, declined sterilization, became pregnant, and following delivery had a recurrence of the prolapse.

Ventrofixation.—Of 19 ventrofixations, 18 (94.7 per cent) were successful and one was a failure (5.3 per cent). This was a thirty-year-

Type Operation	Success (Per Cent)	Partial Success (Per Cent)	Failure (Per Cent)
Entire series	85.8	6.1	8.1
Watkins interposition	87.5	4.7	7.8
Ries fixation	80.0	6.7	13.3
Murphy fixation	100.0		
LeFort oclusion	100.0		
Ventrosuspension	91.0	0.0	9.0
Ventrofixation	94.7		5.3
Supravaginal hysterectomy	75.0		25.0
Vaginal plastic	45.0	36.0	19.0
Vaginal hysterectomy	100.0		
Total	85.8	6.1	8.1

old nullipara with a third degree prolapse complicated by a pelvic and abdominal tuberculosis. A bilateral salpingo-oophorectomy was done together with a ventrofixation. Three months later the prolapse recurred completely. The record of this patient reappears as a failure in the next series.

Supravaginal Hysterectomy.—Supravaginal hysterectomy was done four times. In three instances there was complete success (75 per cent). The fourth, a failure, was the patient with tuberculosis listed as a failure after ventrofixation.

Vaginal Plastic.—Of the eleven patients treated by vaginal plastics, cervical amputation was included in four. Five were successful, four partially successful, and two were failures. Of these failures, one was a thirty-nine-year-old para iv with a second degree prolapse who made an uneventful recovery, and left the hospital of her own accord on the eleventh day. Three years later she returned with a second degree prolapse, was operated by ventrofixation and was cured. The second an uneventful recovery with a fourteen day convalescence. Six months later she returned with a second degree prolapse and a bladder stone. was a forty-four-year-old para iv with a first degree prolapse who had An interposition operation was done and after three months this was likewise a failure.

Vaginal Hysterectomy.—There were five vaginal hysterectomies, all successful.

Stump Fixation.—There were two cervical stump fixations, one a success and one a failure.

Kielland.—There was one Kielland-Wertheim interposition which was a success.

Residual Complaints.—Comparatively few patients in the series had residual complaints. There were five with leucorrhea, three with post-operative cystitis, two with frequency, one with incontinence, two with backache, and one with bearing down. Three developed incisional hernias, one a rectovaginal fistula, and one patient on whom a supravaginal hysterectomy had been performed developed a carcinoma of the cervical stump for which she is now receiving radium treatment.

		SEQUELAE		
<i>Complaints</i>			<i>Findings</i>	
Leucorrhea	5		Incisional hernia	3
P.O. cystitis	3		Rectovag. Fistula	1
Frequency	2		Carcinoma in cerv. stump	1
Incontinence	1			
Backache	2			
Bearing down	1			

Choice of Operation.—A comparative study of the end-results obtained in this series would seem to indicate that a ventrosuspension of the uterus together with a vaginal reconstruction affords the best type of relief in those patients with prolapse in whom childbearing is to be conserved.

The interposition operation is "the operation of choice at the Michael Reese Hospital in 41 per cent of patients with prolapse. It is selected for those patients with a large cystocele, a corpus uteri neither too large nor too small, freely movable and without gross adnexal pathology."⁷³

For older women in whom the uterus is atrophic the Murphy extrafascial fixation operation is preferable when the abdominal wall is competent, and when the patient's condition demands a short operative procedure.

The LeFort vaginal occlusion operation should be limited to older women with atrophy of the cervix and with senile atony of the anterior and posterior fascial and muscular structures, and in whom marital relations have terminated.

The value of the Mayo vaginal hysterectomy for the cure of prolapse of the uterus cannot be discussed further than to point out that preservation of the uterus and its utilization has seemed fundamental to the gynecologic department of the Michael Reese Hospital. The results presented here apparently justify a continuation of those types of operation in use at present.

SUMMARY

In 220 operations for prolapse of the uterus in 212 patients, the average age was 45.8 years, the average parity 4.2, 192 patients (87.3 per cent) were postmenopausal or were sterilized. Twenty-five (11.4 per cent) were first degree prolapse, 73 (33.2 per cent) were second degree prolapse, and 122 (55.4 per cent) were third degree prolapse.

Eleven types of operations were employed. Based on the immediate and remote results, four of these seem best suited to meet particular indications, namely, Gilliam suspension with vaginal reconstruction, the Watkins interposition operation, the Murphy extrafascial fixation operation, and the LeFort vaginal occlusion operation.

There were four deaths (1.8 per cent). One was from cardiac dilatation and shock, one from lobar pneumonia, one from cerebral embolism and one from hemorrhage and shock.

End-results by personal examination were obtained after 148 operations (69 per cent). One hundred twenty-seven (85.8 per cent) were successful, 9 (6.1 per cent) were partially successful and 12 (8.1 per cent) were failures. Combining the cured and improved groups, 136 (91.9 per cent) were successful.

Acknowledgment is hereby made to the members of the gynecologic staff of the Michael Reese Hospital for the use of their records.

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(For discussion, see page 727.)

CLINICAL RESULTS OBTAINED WITH OXYTOCIN AND VASOPRESSIN, THE RECENTLY ISOLATED PRINCIPLES OF PITUITARY EXTRACT*

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THE pituitary gland is remarkable in containing two anatomic divisions that differ materially in their importance to life and their pharmacologic activity. It is also extraordinary that the posterior lobe, which is not so essential to life, contains a hormone or hormones which can produce at least three definite physiologic activities, namely, the effect to stimulate uterine contractions (oxytocic action), the ability to raise the blood pressure (pressor action), and its marked diuretic-antidiuretic effect (renal action).

These actions of the posterior lobe of the pituitary gland are of course well known and widely made use of in stimulating nonstriated muscle to contract as in atonic uterine conditions, intestinal paresis, and vesical atony, to raise lowered blood pressure as in shock, and in the treatment of diabetes insipidus. Chemical information, however, concerning these various physiologic activities is not so well understood and it has been a subject of controversy among biologic chemists as to whether these actions are due to one substance or several different compounds.

American investigators have generally favored the idea of a single hormone. Abel and his collaborators reached such a conclusion in 1923. The English workers, however, have advocated the multiple principle theory and the Germans have claimed the separation of

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three or more. Very recently Kamm, working with his collaborators, Aldrich, Grote, Rowe, and Bugbee, has published an important study in which they have succeeded in completely separating two active principles with distinct physiologic effects. One of these is oxytocic in its action without blood pressure raising effect, and the other is pressor in action raising blood pressure, but without effect in producing contractions in nonstriated muscle fiber. Furthermore, they have been able to recombine these two fractions in the original proportions and have secured a pituitary solution indistinguishable from the original pituitary extract. These two separated principles have been obtained in highly potent form and have been designated as oxytocin and vasopressin.

There is at present only one official standard for posterior lobe extracts of the pituitary gland. This is based upon the oxytocic test of the U. S. Pharmacopoeia. The amount of activity contained in 1 c.c. of the extract has been designated as "10 international units."

It is apparent that in view of the separation of the pressor from the oxytocic principle there should be a pressor standard as well as an oxytocic standard. Kamm has found that there is a fairly constant relation between the amounts of oxytocic and pressor activities in the pituitary extract, and they have provisionally designated the amount of pressor activity in 1 c.c. of the official extract as "10 pressor units." Ordinary pituitary extract as prepared for obstetric use, therefore, contains 10 oxytocic units and 10 pressor units per cubic centimeter, while the pituitary extract for surgical use has twice this strength.

The two separated principles of oxytocin and vasopressin have been obtained as highly potent water soluble powders. The oxytocin assays 12 units of oxytocic activity per cubic centimeter while its pressor activity is considerably less than 1 unit per cubic centimeter. This, therefore, meets fully the U.S.P. potency requirements, yet it is practically devoid of the characteristic blood pressure raising principle of posterior lobe extracts.

The vasopressin has been prepared so that the assay demonstrates that it contains 25 pressor units per cubic centimeter, but when assayed by the oxytocic method, it is found to contain only 1 unit of oxytocic activity.

The research of these investigators indicates that the pressor principle is responsible for the diuretic-antidiuretic action of pituitary extracts. A detailed study of the physiologic effects of these two hormones has not as yet been completed, but as the same two products in admixture are in daily use as pituitary extract, the clinical application can be made with safety.

The clinical application of oxytocin would naturally be suggested for those obstetric cases where it would be detrimental to increase a blood pressure which was already too high, yet where oxytocic results

were indicated as, for instance, in eclampsia or toxemia. It has been our custom at the Woman's Hospital to avoid giving pituitary extract in such cases.

Chipman has stated that the use of pituitary extracts in preeclamptic women precipitated convulsions and that their use was absolutely contraindicated in these toxic cases, in that it produces capillary spasm which increases both the frequency and the severity of the convulsions. If this observation is correct, it is presumably due to the vasomotor fraction, and it would be a natural expectancy that the oxytocic principle alone would not induce it.

It is evident that it is essential to establish clinically that oxytocin alone will accomplish the characteristic effects of pituitary extract when employed for obstetric purposes. To determine this point we have made a series of observations of the effect of oxytocin on the uterus, and a like series with pituitary extract as a control. Fifty cases were studied with oxytocin and 50 cases with pituitrin. The type of case employed for these tests included spontaneous, forceps, and breech deliveries. A routine technic was adopted of injecting two ampules after the birth of the baby and two ampules after the delivery of the placenta. A small number of cases had but one ampule at each injection, but it was found necessary to increase the dose in order to obtain results sufficiently positive to enable accurate observations to be made. The observations were made on the amount of blood loss and on the behavior of the uterus.

TABLE I. BLOOD LOSS (ESTIMATED)

	PITUITRIN	OXYTOCIN
Slight Bleeding (Under 100 c.c.)	14	21
Moderate Bleeding (100-300 c.c.)	33	28
Marked Bleeding (300-500 c.c.)	3	1
Excessive Bleeding (500 c.c. or over—first degree hemorrhage)	0	0
Total Cases	50	50

TABLE II. CONTRACTION OF UTERUS

	PITUITRIN	OXYTOCIN
Strongly Contracted	38	43
Moderately Contracted	9	6
Relaxed	3	1
Total Cases	50	50

The accompanying tables show the result of this study: Table I shows the estimated blood loss in the 100 cases studied with the two products. The cases were grouped under the four headings of slight (under 100 c.c.), moderate (100-300 c.c.), marked (300-500), and excessive (500 c.c. or over, 1 hemorrhage) postpartum blood loss. It will be noted that there was no case with excessive blood loss with either product.

Table II shows the effect of these agents on the contraction of the uterus in the same series. The cases were classified in accordance with their response as strongly contracted, moderately contracted, and relaxed.

A study of these tables shows that while there was no *marked* difference in blood loss or the contraction of the uterus with either oxy-

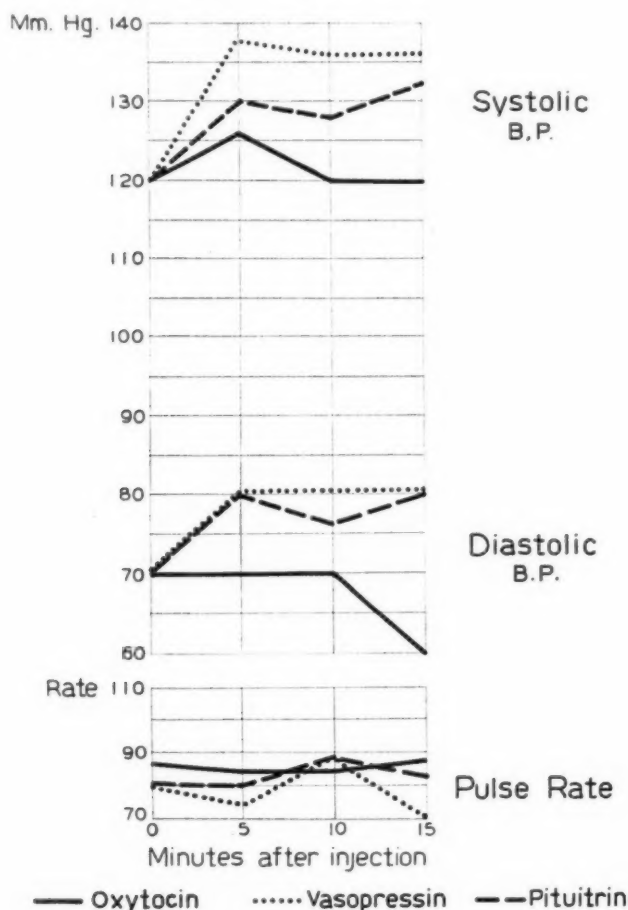


Fig. 1.—Graph showing effect of the hypodermic administration of one ampoule doses of oxytocin, vasopressin and pituitrin in a selected case.

tocin or pituitrin, there was a *slight* difference in favor of oxytocin. There would seem to be no doubt whatever that in this series oxytocin had an equally potent oxytocic action as the standard pituitary extract. Having established this fact, we next attempted to make a comparative study of the effect on blood pressure and the pulse rate of the oxytocin, vasopressin, and pituitrin.

Our first series consisted of 48 cases observed with a one cubic

centimeter dosage of the three products. Systolic and diastolic blood pressure readings were made before and five, ten, and fifteen minutes after administration.

The graphs in Figs. 1 and 2 show typical examples of the response to the substances. In Fig. 1 it will be noted that vasopressin raised the blood pressure in five minutes 17 points systolic and 10 points dias-

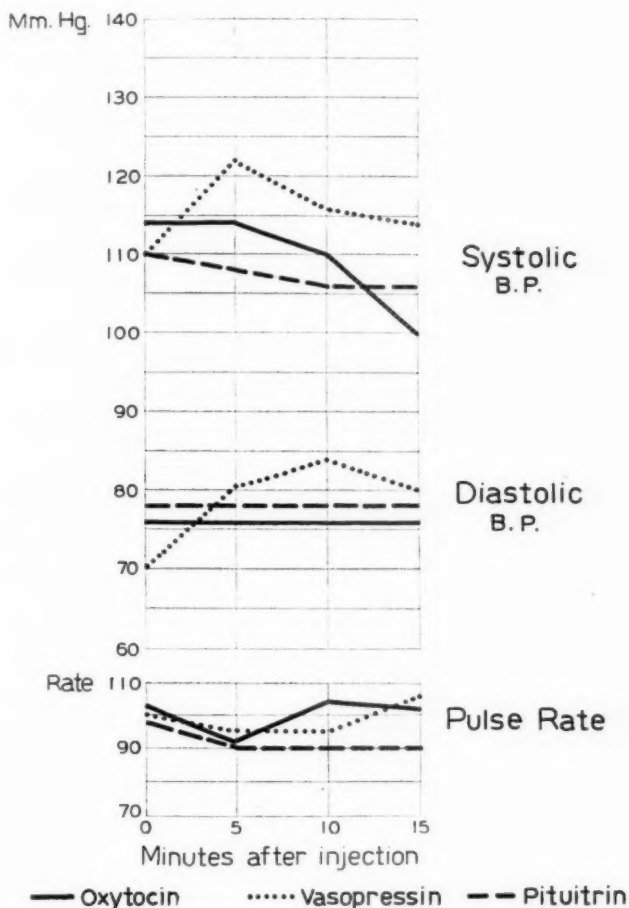


Fig. 2.—The same with two ampoule dosage in a selected case.

tolie, and pituitrin in the same time 10 points systolic and diastolic, which pressures were maintained during the fifteen minute period of observation, while the oxytocin showed at the end of five minutes an increase of only 5 points with immediate drop to normal.

The pulse rate showed a slightly lower average rate with vasopressin and pituitrin than with oxytocin as would be expected, owing to the increased resistance to the blood stream as a result of the higher blood pressure. Fig. 2 gives a similar demonstration.

Fig. 3 shows the average readings of the first series of 48 cases. As will be observed the variations were not marked although they show the same relative differences. We therefore made a second series of 12 cases with an increased dosage of 2 c.c. which demonstrated more positively the differences between the products, as shown in Fig. 4.

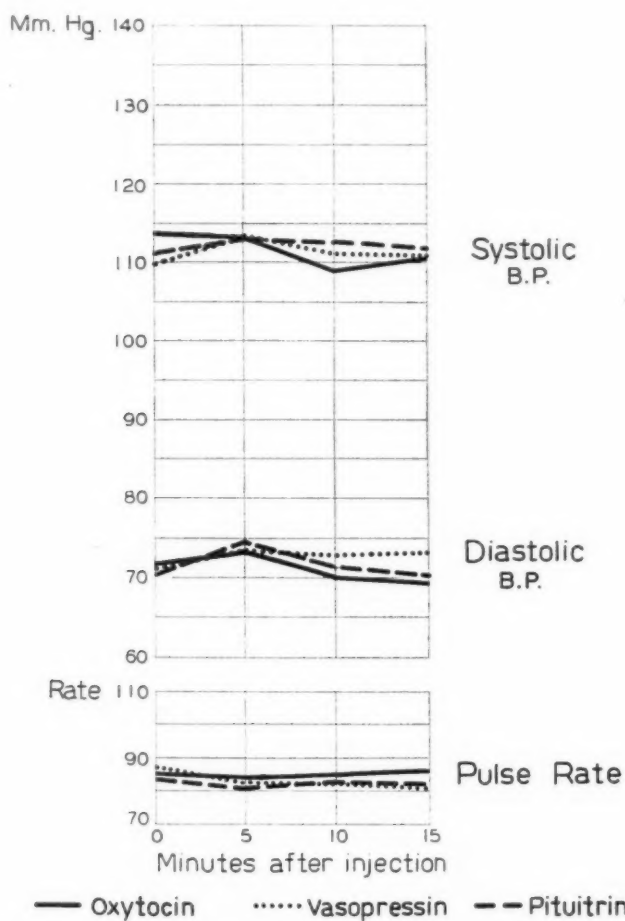


Fig. 3.—Showing average of 48 cases with one ampoule dosage.

A study of these tables demonstrates a definite difference in the effect on blood pressure of oxytocin in contrast to vasopressin and pituitrin. With oxytocin the blood pressures were uniformly lower than with the other products, and the pulse rate was slightly higher. It also appears that vasopressin increases the blood pressure slightly more than the pituitary extract. It was observed that the cases with low blood pressures showed a greater response to vasopressin than

those with high pressures, and that the response appeared more rapid with oxytocin, as vasopressin blanches the tissues, thus slowing absorption.

SUMMARY

1. Our study shows that in this series there was no *marked* difference in the oxytocic action of the oxytocin and pituitary extract. There appeared to be a *slight* difference in favor of oxytocin. The

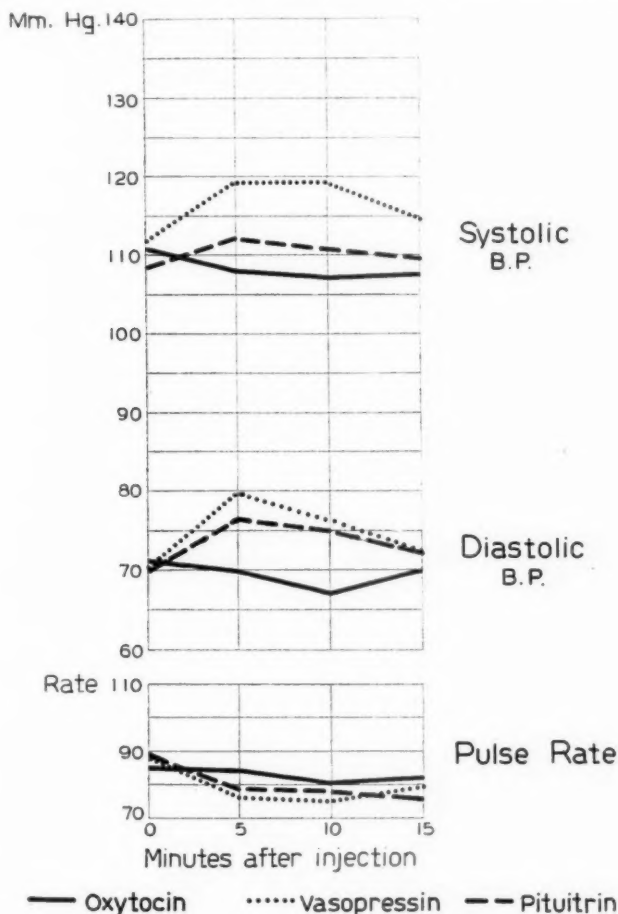


Fig. 4.—Showing average of 12 cases with two ampoule dosage.

oxytocin demonstrated that it fulfilled every requirement necessary for oxytocic action in obstetric usage. We are of the opinion, therefore, that it equals pituitary extract for obstetric purposes.

2. There is a definite difference in the blood pressure raising action of oxytocin as contrasted with vasopressin and pituitary extract, and vasopressin is somewhat more potent in this regard than pituitary extract.

3. The pulse rate is slightly lower with vasopressin and pituitary extract than with oxytocin.

4. The use of oxytocin would appear to be most desirable in those obstetric cases with high blood pressure, as in toxemia and eclampsia. Vasopressin would be indicated in cases of surgical shock to raise abnormally low blood pressure and in diabetes insipidus. Pituitary extract would probably be most suited for cases of postoperative atony of the intestines or bladder where the combined effect on the blood vessels and the nonstriated musculature was desired.

5. More extensive clinical observations are necessary to confirm the facts as demonstrated in this limited series.

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48 EAST FIFTY-SECOND STREET.
121 EAST SIXTIETH STREET.

(For discussion, see page 739.)

A COMPARATIVE STUDY OF CERTAIN GYNECOLOGIC AND OBSTETRIC CONDITIONS AS EXHIBITED IN THE COLORED AND WHITE RACES*

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ALTHOUGH technically the American negro has been free for more than half a century, in the South, at least, he is traditionally the servant of the white man, and it is poor psychology and false sentimentality to ignore that fact. By nature he is carefree, indifferent to responsibility, and quite without regard for the future. Likewise by nature his intellectual, moral, and social qualities are inferior to those of the white man, and this inherent weakness has been intensified by centuries of servitude, physical as well as psychologic. Thus his nature and his environment account for the fact that his race furnishes the largest proportion of indigent, dependent, and defective individuals in the South, a state of affairs which has apparently not been improved by the increasing number of negro insurance and sick benefit associations which have come into existence in recent years. The negro is the responsibility of the Southern physician and the Southern hospital, and it is a matter of self-preservation and an economic necessity that his health be safeguarded, quite aside from the humanitarian aspects of the question.

*Read at the Fifty-third annual meeting of the American Gynecological Society, held in Washington, D. C., April 30-May 2, 1928.

The typical American negro of the present day, if he is of the pure black type, is a composite of the generic characteristics of the various primitive peoples from whom he is descended. But according to the last census at least a fifth of all American negroes exhibit some strain of white or Aryan blood, for legal restrictions, no matter how severe, are unable to prevent miscegnation entirely, and the resulting mulatto type furnishes a very real problem, medically as well as socially. Reliable data are lacking, but it is a generally accepted fact that the crossed strain has not the strength or the endurance of either of the pure races. The white blood loses more than the negro gains by the admixture. Superficially, at least, in this instance the law of Mendel ceases to function, for the offspring of such unions seem to inherit 100 per cent of the weaknesses of each race, and if intermarriage among the mulatto offspring continues, the resulting strain is feebler still.

The negro race does not adapt itself well to the strain of city life. Under it its natural fecundity is slowly disappearing, and for the last quarter of a century the negro birth rate, which was formerly far in advance of the white, has been some 40 per thousand less. It is also estimated that more than a quarter of all negro children born alive die before the fifth year, and that syphilis, tuberculosis, and secondary pneumonia cause among them a mortality 22 per cent higher than similar diseases cause among white children of the same age. Moreover, while such typical native diseases of the negro as yaws, elephantiasis and sleeping sickness have largely disappeared during their three centuries on the American continent, this gain has been more than offset by a loss of their natural immunity to the so-called diseases of civilization, notably malaria, tuberculosis, and nervous and intestinal diseases.

Whether Pearson's theory is correct, that the negro lies nearer to the common stem than does the European and so is nearer to the childhood of the race, I am not biologist enough to say, but my own experience is that of other clinicians, that his nervous system exhibits a lessened sensibility to pain and shock, and that the pure black type is the safest surgical risk to be found in our hospitals, though the mulatto is a poorer surgical subject than either of the pure races. The negro is an excellent subject for local anesthesia and he bears general anesthesia equally well unless his emotional nature has been aroused, in which case the excitement stage may be extreme. On the other hand, his habits of life are naturally unhygienic, his lack of moral sense leads to promiscuous mating, venereal disease is widespread, and his disregard of the prodromal symptoms of disease, unless pain is a feature, frequently means that the ultimate pathology offers very grave problems.

TABLE I. CHARITY HOSPITAL OF LOUISIANA 1917-1926

*Hospital Population and Bed Space**

Total hospital population	204,584
55.7 per cent white, 44.3 per cent colored	
Total female admissions	79794
Divided approximately equally	
Gynecologic admissions	20477
44.3 per cent white, 55.7 per cent colored	
Obstetric admissions	17016
41.9 per cent white, 58.1 per cent colored	
Present number beds	1551
Average number during decennium	1230
10 per cent of total number gynecologic	
5.2 per cent of total number obstetric	

A comparative study of disease in the colored and white races is always enlightening, and as based on the records of the Charity Hospital of Louisiana it is truly representative because of the size of the institution and the enormous number of admissions. This is particularly true of the gynecologic and obstetric services. During the decennium which the present study covers, 1917-1926, the gynecologic admissions comprised more than 25 per cent of all female admissions and nearly 29 per cent of the colored female admissions, while the obstetric admissions comprised more than 21 per cent of the female admissions and nearly 11 per cent of the colored female admissions. In spite of the fact that approximately a third of the total hospital bed space is allotted to colored patients, the facilities are entirely inadequate and constant overcrowding is the result, so that in an unbelievable number of instances, especially on the gynecologic and obstetric services, two patients must be cared for in the same bed.

TABLE II

Pelvic Disease

6918 cases, 30.9 per cent white, 69.1 per cent colored
Incidence figured on female admissions
White 5.4 per cent, colored 11.9 per cent
Incidence figured on gynecologic admissions
White 23.6 per cent, colored 41.8 per cent
Mortality 194 (2.8 per cent)
White 2.2 per cent, colored 3.1 per cent

According to the Charity Hospital figures pelvic disease is roughly twice as frequent in colored women as in white, and basing my conclusions on the clinical history, the clinical study and the operative findings, I do not hesitate to say that probably 90 per cent of it is of specific origin, largely due to the high incidence of gonorrhea in the colored male and to the general racial habit of promiscuous sex relations. Laboratory examinations, of course, are no more successful in isolating the organism here than they are elsewhere. My experience is that in colored women infections of the lower genital tract seldom

*Percentages throughout are figured to the nearest fraction.

remain local, and that almost always, given the same infecting agent, the disease tends to be more severe in them because they do not seek relief until pain and actual incapacity force them into the hospital. For this reason the resulting pelvic pathology may be almost incredible. It is not unusual to find multiple pus pockets, sometimes containing a quart or more of pus, scattered throughout the pelvis. Anatomic distortion of the pelvic viscera may be so extreme that all the usual landmarks are obliterated. Intestinal adhesions are often so dense that fistulas result from their release. Indeed, at operation one frequently marvels how these women have lived at all, let alone remained, as most of them do remain, in relatively good physical condition. Such extensive pathology, particularly when associated, as it very frequently is, with secondary ovarian disease, results in prolonged temperature elevations and necessitates long periods of cooling, which the colored patient often heartily resents; she may be slow in applying for relief, but, once she has applied, she can see no reason why she should not secure it immediately.

Obviously operation must be done in the great majority of cases, probably 90 per cent of them all. Quite aside from the pathology, the wholesale ignorance of the colored race prevents the employment of the isolation treatment which has given such brilliant results in the hands of Curtis and of others, and their improvidence does not permit of the experiments in conservatism which would be warranted in the white woman. Complete extirpation of the pelvic organs is frequently necessary, not only because of the specific origin of the pathology and its extent and severity, but also because of the social and economic considerations which can never be ignored in the negro.

TABLE III

Chancroid

164 cases, white 12.2 per cent, colored 87.8 per cent
Incidence figured on female admissions
White 0.05 per cent, colored 0.37 per cent
Incidence figured on gynecologic admissions
White 0.2 per cent, colored 1.3 per cent

Condyloma

41 cases, white 19.5 per cent, colored 80.5 per cent
Incidence figured on female admissions
White 0.02 per cent, colored 0.08 per cent
Incidence figured on gynecologic admissions
White 0.09 per cent, colored 0.3 per cent

Vaginitis

435 cases, white 77.4 per cent, colored 22.6 per cent
Incidence figured on female admissions
White 0.8 per cent, colored 0.2 per cent
Incidence figured on gynecologic admissions
White 3.7 per cent, colored 0.9 per cent

The fact that the colored mortality rate is only 0.9 per cent higher than the white is rather remarkable, in view of the extensive pathology and the consequent radical surgery, and to my mind it indicates quite conclusively that the colored woman has a greater resistance to trauma and to infection than has the white.

A greater frequency of chaneroid and condyloma is to be expected among colored women because of the greater prevalence of venereal disease among them, and the two deaths from septicemia in the chaneroid group prove that that disease is more virulent also. Vaginitis, on the other hand, is decidedly less frequent than among the whites, which, since the incidence of gonorrhea is much higher in colored women, seems to suggest a lessened sensitiveness of their vaginal tissues.

TABLE IV

Fibroids of Uterus

2991 cases, white 10.2 per cent, colored 89.8 per cent
 Incidence figured on female admissions
 White 0.8 per cent, colored 6.7 per cent
 Incidence figured on gynecologic admissions
 White 3.4 per cent, colored 23.5 per cent
 Mortality 146 (4.9 per cent)
 White 4.6 per cent, colored 4.9 per cent

Lipoma of Vulva

4 cases, all in colored
 Incidence figured on female admissions 0.01 per cent
 Incidence figured on gynecologic admissions 0.04 per cent

Elephantiasis of Vulva

18 cases, white 5.6 per cent, colored 94.4 per cent
 Incidence figured on female admissions
 White 0.003 per cent, colored 0.04 per cent
 Incidence figured on gynecologic admissions
 White 0.01 per cent, colored 0.1 per cent

Just why fibroids of the uterus should be so much more frequent in colored women than in white is not clear, but it is undoubtedly true that from a third to a half of all colored women over fifty years of age present this type of growth. It is the general impression that they are completely unknown among primitive African tribes, but it is hard to see any relation between their development and the increasing civilization of the negro. They originate earlier in negro women, probably because function develops earlier in them, and the frequent associated absolute or relative sterility is a particularly striking feature of the disease in a race that is ordinarily fecund.

My own experience is that both submucous fibroids and adenomyomas are less frequent in colored women than the other varieties, and the same fact, by the way, is true of endometriomas. Multiple growths of considerable size are the rule, and many times I have seen one hundred or more in the same patient. Growths reaching to the umbilicus, to the costal margin and even higher are quite frequent,

and in from 80 to 90 per cent of the colored patients the tumors can be palpated abdominally without any difficulty. More striking than the size and multiplicity of the growths, however, is the uniformity with which colored women seem to ignore their existence.

In these enormous tumors, veins as large as snakes sometimes course over the top and often can be palpated through the peritoneum before the cavity is opened. Rupture of such veins is a rare complication but I have personally seen it twice. Degeneration of all types is common, and calcareous degeneration, in particular, may be so extreme that the growth seems wholly mineral. Tubal disease is a complication of probably 90 per cent of all fibroids in colored women in the South, and is often so extensive that it is hard to say which is the primary pathology. Gonorrhea naturally explains much of it, but the pressure effects of the tumor cannot be ignored as a causative factor. In my experience it is the pain of this complication which brings the colored woman to the hospital more often than the discomfort of her tumor, large though it be.

It is rare that a fibroid in a colored patient does not require treatment. Irradiation and myomectomy are obviously possible only in the occasional case; the size and multiplicity of the growths and the prevalence of adnexal disease are definite contraindications to their use, while social and economic considerations again demand that that mode of treatment shall be instituted which will ensure a prompt and permanent cure. Hysterectomy is therefore necessary in some 98 per cent of all cases, and the high incidence of cervical infection demands the frequent employment of the complete operation, though cervical lacerations are comparatively rare. The problems of technic, as can be imagined, are frequently stupendous, due to the size of the tumors, their impaction in the pelvis, and the complications of the associated tubal disease, and it is again remarkable, in view of the wide difference in the pathology and in the extent of the surgery necessary, that the mortality rates in the two races should be so nearly identical.

Lipoma of the vulva was encountered only in the colored race during this decade, and seventeen of the eighteen cases of elephantiasis of the vulva were also in this race. A detailed study of the records would be necessary to establish how many of these were of the true parasitic type, but it is interesting to observe that even in these enlightened days colored women sometimes present this disease to a degree approximating the typical Hottentot apron.

In spite of a fairly general belief to the contrary, the statistics from this institution and from other clinics prove that carcinoma of the uterus is rather more frequent in colored women than in white. Predisposing obstetric lesions are certainly fewer among them, but the high incidence of predisposing cervical lesions more than offsets

TABLE V

Carcinoma of Uterus

1462 cases, white 39.2 per cent, colored 60.8 per cent
Incidence figured on female admissions
White 1.4 per cent, colored 2.2 per cent
Incidence figured on gynecologic admissions
White 6.3 per cent, colored 7.6 per cent

Carcinoma of Breast

528 cases, white 37.9 per cent, colored 62.1 per cent
Incidence figured on female admissions
White 0.5 per cent, colored 0.82 per cent
Mortality 48 (9.1 per cent)
White 12.5 per cent, colored 7.1 per cent

this gain. The prevalence of fibroids in the colored race would seem to suggest that the incidence of fundal carcinoma would be materially higher among them, but our records do not support this view, possibly because our laboratory examinations are inadequate. The colored woman is apparently no more dilatory in applying for treatment than is her white sister, and among both races, because of the class from whom the hospital population is drawn, the percentage of hopeless cases is very high. The operative incidence is certainly not more than 1 per cent, and in an appalling number of cases only palliative treatment is possible. The colored patients exhibit an unusually high percentage of ugly complications, especially fistulas; in some instances these may be due to ill-advised irradiation, but undeniably the incidence is increased by their general disregard of the laws of hygiene and of ordinary cleanliness, as well as by the incidence of rectal syphilis.

The mortality rates, 8 and 6.6 per cent respectively, mean nothing, partly because of the type of treatment, which is practically always by irradiation or by palliative measures, and partly because of hospital conditions: through the efforts of the social service many patients formerly kept in the hospital until death are now handled by other agencies or at home, to permit the bed space to be utilized for those who can be helped, while on the other hand, many patients are admitted to the hospital to die, in an astonishing number of instances admitted actually moribund, because they cannot be cared for elsewhere.

Carcinoma of the breast is likewise more frequent among colored women, though the mortality, which I believe is mainly surgical, is considerably less. Carcinoma has become a common disease in the American negro only within the last few generations, possibly for the same reason that it is becoming more frequent among the whites, greater longevity and a more accurate certification of the causes of death. This does not, however, explain its relatively higher incidence among them, and we are forced to the conclusion that the preponderance of genital and breast malignancy among them is a true racial peculiarity.

TABLE VI. OBSTETRIC INJURIES

Perineal Injuries

886 cases, white 80.6 per cent, colored 19.4 per cent
 Incidence figured on female admissions
 White 1.8 per cent, colored 0.4 per cent
 Incidence figured on gynecologic admissions
 White 7.9 per cent, colored 1.5 per cent

Cervical Injuries

1083 cases, white 82.2 per cent, colored 17.8 per cent
 Incidence figured on female admissions
 White 2.5 per cent, colored 0.5 per cent
 Incidence figured on gynecologic admissions
 White 9.8 per cent, colored 1.7 per cent

Retrodisplacements

1001 cases, white 70.6 per cent, colored 29.3 per cent
 Incidence figured on female admissions
 White 1.87 per cent, colored 0.74 per cent
 Incidence figured on gynecologic admissions
 White 7.8 per cent, colored 2.6 per cent

Fistulas

164 cases, white 32.3 per cent, colored 67.7 per cent
 Incidence figured on female admissions
 White 0.14 per cent, colored 0.28 per cent
 Incidence figured on gynecologic admissions
 White 0.6 per cent, colored 0.96 per cent

Obstetric injuries, with the single exception of fistulas, are decidedly less frequent in colored women than in white, as would be expected in a race which bears its children largely without mechanical aid, both because they are smaller and because the head circumference is less. Levy's detailed study of five hundred cases of each race from the obstetric clinic of Touro Infirmary substantiates these points absolutely, and his (unpublished) figures based on the same study show, as do ours, a relatively small percentage of cervical and perineal injuries and of uterine displacements. Fistulas, however, are considerably more frequent in colored women than in white, and often they are of an extremely ugly type, because of lack of cleanliness, and, in the case of rectal fistulas, because of the high incidence of rectal syphilis. Fistulas are comparatively infrequent in white women today because the general standard of obstetric practice is materially improved over what it was a generation ago, but this is not the case, unfortunately, with colored women, in whom the majority of deliveries are handled outside of the hospital, either by midwives or by inexperienced practitioners. They are usually saved from meddlesome interference because they bear their children so easily, but when complications do arise and labor is unduly prolonged, fistulas of the sort seldom found in white women today are an inevitable consequence. It is comparatively rare for any sort of obstetric injury except fistulas to be encountered on my own colored service, where, because of the high yearly turnover, in the run of things a fair number could be expected.

Since salpingitis is an accepted cause of ectopic pregnancy, one would expect the incidence of the latter condition to be considerably more frequent in colored women, whereas the figures (1.8 and 1.5 per cent respectively) show it to be slightly less. It is a remarkable and inexplicable fact that all of the eleven ectopic pregnancies which went to term during the period covered by the hospital records (1906 to date) occurred in colored women.

TABLE VII

Deliveries

9693, white 36.4 per cent, colored 63.6 per cent
Abnormal deliveries 675 (7 per cent)
White 11.1 per cent, colored 4.5 per cent

Abortions

2186, white 56.6 per cent, colored 43.4 per cent
Incidence figured on obstetric admissions
White 17.3 per cent, colored 9.6 per cent

Premature Labors

359, white 41 per cent, colored 59 per cent
Incidence figured on obstetric admissions
White 2.05 per cent, colored 2.1 per cent

Stillbirths

1024, white 30 per cent, colored 70 per cent
Incidence figured on deliveries
White 8.6 per cent, colored 11.6 per cent

Premature Births

511, white 44.8 per cent, colored 55.2 per cent
Incidence figured on obstetric admissions
White 3.2 per cent, colored 2.8 per cent

The tremendous demand on the colored obstetric service at Charity Hospital is borne out by the fact that while during this decade the ratio of colored to white obstetric beds was less than 3 to 7, the ratio of deliveries was more than 6.5 to 3.5. Abnormal deliveries, as these figures show, are comparatively rare among colored women, chiefly for the reasons we have already set forth, the smaller size of the child and the smaller circumference of its head. To this might be added a less scientific reason, that forceps applications are seldom made in colored women to terminate a labor which is progressing normally, albeit slowly, because their lessened sensibility to pain makes them slower to demand relief than white women. Indeed, the number of abnormal deliveries in both races is comparatively small, in view of the many "operative possibilities," to use Williams' expression, which naturally occur in a public hospital of this size. Except possibly in the case of cesarean section, in which in New Orleans as elsewhere obstetric judgment sometimes ceases to function, the indications for interference on both colored and white services seem to have been reduced almost to rock bottom.

The incidence of contracted pelvis is slightly greater among white women (0.76 per cent to 0.37 per cent), in marked contrast to the relatively high incidence reported by Williams for the colored service at Johns Hopkins. The explanation, however, is not far to seek: he works in a city which is essentially Northern in mode of life and his patients live in tenements and in typical tenement surroundings, whereas the negro of the far South, both in the city and in the surrounding country, whatever else he may lack has in abundance fresh air and sunshine, those two arch enemies of rickets. Levy's report from the Touro Clinic, I might add, corroborates these findings as to the relatively small percentage of contracted pelvis among colored women in this part of the country.

The real figures for both abortion and premature labor in colored women are, I believe, considerably higher than the hospital records indicate. Because the colored woman bears her children so easily, she is prone to ignore obstetric conditions unless they become pathologic, and for this reason the hospital admissions for both abortion and premature labor are likely to be less on the colored service than on the white. Both accidents, as a matter of fact, are probably considerably more frequent in the colored race because of the higher incidence of syphilis. A study of the city health records would be necessary to establish this point statistically, but from casual observation I feel safe in saying that the incidence of syphilis on the colored obstetric service at Charity Hospital probably runs between 12 and 15 per cent. This is higher than Levy's report of 7.8 per cent from the Touro Clinic, but less than Williams' report of 16.2 per cent from Johns Hopkins, McCord's of 30 per cent from the Emory Clinic, and Bartholomew's of 34 per cent from Grady Hospital. The results of antisyphilitic treatment are as brilliant here as elsewhere, but unfortunately the negro woman does not usually report to the clinic early enough in her pregnancy to make it either possible or effective.

Stillbirths are 3 per cent higher among negroes than among whites, again due to syphilis, as would be suggested by the large number of macerated feti in the absence of toxic complications, quite aside from a study of the maternal and cord Wassermanns. The mortality among premature babies is also higher in this race, 93.3 per cent as against 88.6 per cent in the whites. These statistics, I might add, are not as damning as they seem, for the reason that approximately a third of these children were born before admission to the hospital, and also for the reason that the record room follows the very unscientific and inaccurate plan of registering as premature all infants born alive before term, regardless of whether or not they have reached the period of viability, which naturally increases the death rate out of all proportion to what it would be under more scientific methods of calculation.

TABLE VIII

Septicemia

234 cases, white 56 per cent, colored 44 per cent
 Incidence figured on obstetric admissions
 White 1.8 per cent, colored 1.04 per cent
 Mortality 75 (32 per cent)
 White 30.6 per cent, colored 33.9 per cent

Eclampsia

259 cases, white 42.1 per cent, colored 57.9 per cent
 Incidence figured on obstetric admissions
 White 1.5 per cent, colored 1.5 per cent
 Mortality 111 (42.9 per cent)
 White 36.7 per cent, colored 47.3 per cent

I need scarcely say that only a negligible number of the cases of septicemia handled during the decennium developed in patients delivered entirely under hospital supervision. The higher incidence in white women is easily explained by the fact that interference during labor, the most frequent causative factor, is more frequent among them than among colored women, while the higher mortality among the negroes is plainly due to their disregard of the condition in its early stages, when it might be amenable to treatment. This same fact, I believe, explains the very high mortality of eclampsia among the colored (10.6 per cent higher than among the whites), although the incidence of the disease is exactly the same in both races. It is naturally difficult to institute accurate comparisons in this regard, since the methods of treatment on the various services often differ radically, but it is only fair to the hospital to add that conservative treatment is now practically routine. Formerly the general hospital mortality ranged between 35 and 43 per cent, but for 1927, with conservative treatment practically uniform on all services, it was roughly 15 per cent, and on the service of which I was formerly chief and which is now in charge of my successor and former associate, E. L. King, it has been reduced to less than 10 per cent.

TABLE IX

Placenta Previa

81 cases, white 64.2 per cent, colored 35.8 per cent
 Incidence figured on obstetric admissions
 White 0.73 per cent, colored 0.3 per cent
 Mortality 22 (27.2 per cent)
 White 19.2 per cent, colored 41.4 per cent

Vomiting of Pregnancy

149 cases, white 65.8 per cent, colored 34.2 per cent
 Incidence figured on obstetric admissions
 White 1.4 per cent, colored 0.5 per cent
 Mortality 20 (13.2 per cent)
 White 14.3 per cent, colored 11.8 per cent

Why placenta previa should be more frequent among white than among colored women it is not possible to say, though the markedly higher mortality in the colored—the difference is 22.2 per cent—is

easily explained by the fact that the negro woman is more likely to ignore the initial hemorrhage, particularly if it be not severe, and therefore is more likely to be infected prior to admission. Also it is not possible to say why the graver forms of the vomiting of pregnancy should be less frequent among colored women. True toxic vomiting is especially rare, but it is seen, and the gravity of the condition when it does occur is proved by the fact that the colored mortality for this complication of pregnancy is only 2.5 per cent less than the white. Here also it should be stated that the general hospital mortality has recently shown a marked decrease with the substitution of intravenous therapy for empiric methods of treatment and particularly for the late induction of abortion.

TABLE X

Maternal Mortality

Figured on deliveries 198 (2 per cent)
White 2.3 per cent, colored 1.9 per cent
Figured on obstetric admissions 404 (2.4 per cent)
White 2.7 per cent, colored 2.2 per cent

In spite of all the untoward factors which operate in the colored race the maternal mortality, no matter how figured, is less than it is among white women, another proof, I would say, of their naturally higher resistance to trauma and to infection. Eclampsia, however, was responsible for 31.7 per cent of the deaths among white women at delivery and for 44 per cent among colored women, while placenta previa was responsible for 8.5 per cent of similar deaths among the white and 9.5 per cent among the colored. I need scarcely point out

TABLE XI. SURGICAL DISEASES*

Chronic Appendicitis

6931 cases, white 81.5 per cent, colored 18.5 per cent
Incidence white 4.93 per cent, colored 1.4 per cent
Mortality 71 (1.02 per cent)
White 0.0078 per cent, colored 2.1 per cent

Acute Appendicitis

1901 cases, white 68 per cent, colored 32 per cent
Incidence, white 1.13 per cent, colored 0.7 per cent
Mortality 294 (15.4 per cent)
White 14 per cent, colored 18.7 per cent

Cholecystitis

466 cases, white 81.8 per cent, colored 18.2 per cent
Incidence white 0.3 per cent, colored 0.09 per cent

Cholelithiasis

84 cases, white 89.3 per cent, colored 10.7 per cent
Incidence white 0.065 per cent, colored 0.01 per cent

Nephrolithiasis

48 cases, white 89.6 per cent, colored 10.4 per cent
Incidence white 0.04 per cent, colored 0.005 per cent

*All percentages figured on total hospital admissions.

that the analysis of death rates in a hospital of this type is scarcely fair, since it is literally the dumping ground for all the neglected complications of pregnancy and all the mismanaged deliveries not only in the city but also in the adjacent state, and since patients are often admitted in extremis and beyond human aid, however skillful it may be.

Certain surgical diseases are sufficiently different in the two races to warrant their brief mention, even though it transcends the limits of my subject. Thus chronic and acute appendicitis are both several times more frequent in the white race, though the mortality in the colored is considerably higher. As Matas pointed out years ago, the preponderance of lymphoid tissue in the colored would lead us to expect exactly the reverse of these findings, and as far as I know, no reasonable explanation of the facts has ever been advanced. Matas' report naturally includes only a very small number of cases, since the disease was just beginning to be recognized at the time it was written, but his conclusions are amply confirmed by the present study.*

All types of gall bladder pathology are less frequent in the colored race, and gallstones are decidedly rare. In the 196 cases collected from the records by Bloch, only 17 were in negroes. He arrives at no definite conclusions as to the reason for this marked discrepancy, since the main predisposing factors are apparently the same in both races, the only apparent difference being a relatively minor one, that the active and outdoor occupations habitual with the negro may be responsible for a lesser degree of stagnation in the bile passages.

Likewise nephrolithiasis is decidedly infrequent among negroes, the incidence for this decennium being even less than that reported by Matas thirty years ago. The condition is admittedly rare among both races in the Gulf States, though why this should be so has never been satisfactorily explained.

In the limitations of space which I have had to observe I have been able to do little except to call attention to the varying incidence of certain diseases in the white and colored races, and to point out certain clinical problems as they are exhibited especially in colored women. This is not a truly scientific study, nor, for that matter, is it a clinical paper. When the material for a dozen lengthy monographs must be compressed into a few pages, the results can be only superficial. A study of this sort, to be of real value, would require a careful analysis of individual records, a tabulation of the results by a trained statistician, and finally their interpretation by a skilled clinician working with an equally well equipped ethnologist. As Matas pointed out many years ago, the records of Charity Hospital

*I regret very much that because of the different premises as well as the changes in diagnosis and nomenclature during the last thirty years it has not been possible to institute detailed comparisons between his report and my own, as I had originally hoped to do.

form a veritable treasure house for the student of racial pathology, and I have presented this very imperfect discussion in the hope of calling attention to their manifold and as yet barely touched possibilities. If they are ever properly evaluated, there is no branch of medicine which will not profit thereby.

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512 HIBERNIA BUILDING.

(For discussion, see page 725.)

RELAXATION OF THE ANTERIOR VAGINAL WALL*

WITH A REPORT OF THE END-RESULTS IN A SERIES OF 100 CASES

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RECENT improvements in operative technic and careful selection of cases have brought about a comparative uniformity of good results in patients operated upon for cystocele. Nevertheless, occasional cases are still encountered in which the postoperative condition is not entirely satisfactory.

A few such instances came to our notice in the Follow-Up Clinic and this analysis was undertaken in an effort to determine the cause of the occasional poor functional result in those cases in which the anatomic restoration appeared good. The study is based on the records of one hundred cases of cystocele. The series represents the work of six members of the staff of the John Goodrich Clark Gynecologic Clinic of the Hospital of the University of Pennsylvania. Each case included in the series has been followed closely for at least twelve months from the date of operation, and each patient has been examined by a member of the gynecologic staff. The cases are not selected as the series is made of consecutive followed-up cases operated upon prior to January 1, 1926.

The cases were studied from two standpoints, the anatomic result and the functional result. In classifying them a more or less arbitrary scale was necessarily adopted; for cases in which there was a firm restoration of the supporting structures and in which there was no descensus of the anterior vaginal wall on straining the term "per-

*Read at a Joint meeting of the New York, Philadelphia and Boston Obstetrical Societies, held in New York, April 10, 1928.

fect anatomic result" has been used. The term "fair anatomic result" designates those cases in which there remains a small urethrocele or a slight bulging of the anterior vaginal wall on increase of pressure. The cases of recurrence are grouped under the term "poor anatomic result."

TABLE I. ANATOMIC RESULTS

	PER CENT
Total number of cases	100
Perfect anatomic result	86
Fair anatomic result	10
Poor anatomic result	4

In Table I the anatomic results obtained from various operative procedures are grouped together. In the choice of the type of operation to be used each case is considered on its own merits and that procedure is carried out which best meets the requirements of associated lesions. Consequently, five different combinations of operative procedure were utilized in this group of cases.

TABLE II. ANATOMIC RESULTS WITH REFERENCE TO TYPE OF OPERATION

TYPE OF OPERATION	GOOD	FAIR	POOR
Anterior colporrhaphy	90.1%	8.4%	1.5%
Vaginal hysterectomy and anterior colporrhaphy	63.3%	28.5%	7.2%
Suspension and anterior colporrhaphy	100.0%		
Watkins' interposition operation	66.6%		33.3%
Abdominal hysterectomy and anterior colporrhaphy	100.0%		

From a study of Table II, it appears that better results were obtained in those cases in which the uterus was either suspended or removed by the abdominal route. Gravity and intraabdominal pressure are important causative factors in the production of recurrences. If the uterus is left in or subsequently assumes a position parallel with the long axis of the body, intraabdominal pressure is exerted upon the fundus and the cervix is necessarily forced downward. The only restraining structures are the ligaments and the recently repaired pelvic floor. On the other hand, if the uterus is left in well-marked anteversion this spear head or wedge-like action is nullified. When a vaginal hysterectomy is performed and the bases of the broad ligaments overlapped and their upper portions strongly sutured to the symphysis, after the manner suggested by G. G. Ward, a strong shelf is secured and recurrence is unlikely. The high percentage, 90 per cent, of good results in the 54 cases treated by simple anterior colporrhaphy, was most encouraging. We feel, however, that this can be improved considerably by more care in the preliminary study of the cases, and definite attention to the urethrocele, if such a lesion is present. Too often the incision in the anterior vaginal wall was not extended far enough anteriorly. On this error we blame the few cases of persistent or recurrent urethrocele.

Following the study of the anatomic results we investigated the postoperative vesical function. In our series of 100 cases seventy-six patients complained of vesical symptoms prior to operation. The remaining twenty-four patients complained of no urinary symptoms and sought relief only on account of the uncomfortable protrusion from the vaginal orifice. The chief symptoms encountered were frequency of urination, incontinence of urine, and difficulty in starting the flow. This last symptom in most of the cases, could be overcome by manual replacement of the cystocele. In classifying the results more or less arbitrary groups were necessarily formed. In Table III the term "perfect postoperative functional result" designates those patients in whom there was no abnormality of vesical function following the repair. The terms "improved" and "unimproved" are self-explanatory.

TABLE III. FUNCTIONAL RESULTS

Number of patients with preoperative vesical symptoms	76.0%
Perfect postoperative functional results	84.2%
Improved postoperative functional results	11.8%
Unimproved postoperative functional results	3.9%

In comparing Table I and Table III, it will be seen that the anatomic and functional results are practically equal in each of the groups. It was surprising, however, to find that, with only one exception, all of the patients with fair or poor anatomic results had perfect vesical function; and, further, that all of the patients with persistent urinary complaints showed, on examination, a perfect anatomic result from operation. In other words, a poor anatomic result is compatible with perfect vesical function, and vice versa as determined by the ordinary pelvic examination.

The functional results were analyzed according to the type of operation utilized in repair of the cystocele. This analysis is found in Table IV.

TABLE IV. FUNCTIONAL RESULTS WITH REFERENCE TO TYPE OF OPERATION

OPERATION	PERFECT RESULT	IM- PROVED	UNIM- PROVED
Anterior colporrhaphy	85.2%	11.1%	3.7%
Vaginal hysterectomy and anterior colporrhaphy	81.9%	18.1%	----
Abdominal hysterectomy and anterior colporrhaphy	*100.0%	-----	-----
Watkins' interposition operation	60.0%	20.0%	20.0%
Suspension and anterior colporrhaphy	†100.0%		

*1 Case.

†5 cases.

TABLE V. ANALYSIS OF RELIEF FROM INDIVIDUAL SYMPTOMS

SYMPTOM	NUMBER OF PREOPER- ATIVE COMPLAINTS		IMPROVED	UNIMPROVED
		RELIEVED		
Frequency	48	87.5%	10.5%	2.0%
Dysuria	29	89.6%	10.4%	----
Incontinence	32	84.4%	6.3%	9.3%

A further analysis was made to determine the percentage of cases in which each of the individual preoperative vesical symptoms was relieved by operation. These results are shown in Table V.

The most annoying postoperative symptom is the persistence of incontinence, which, in our series, occurred in 15.6 per cent of all patients who sought relief from this symptom. As stated previously, with only one exception, all of the patients in whom the incontinence was not relieved had apparently perfect anatomic results following operation as far as could be determined by the ordinary clinical criteria. Believing, however, that the persistent incontinence is due to

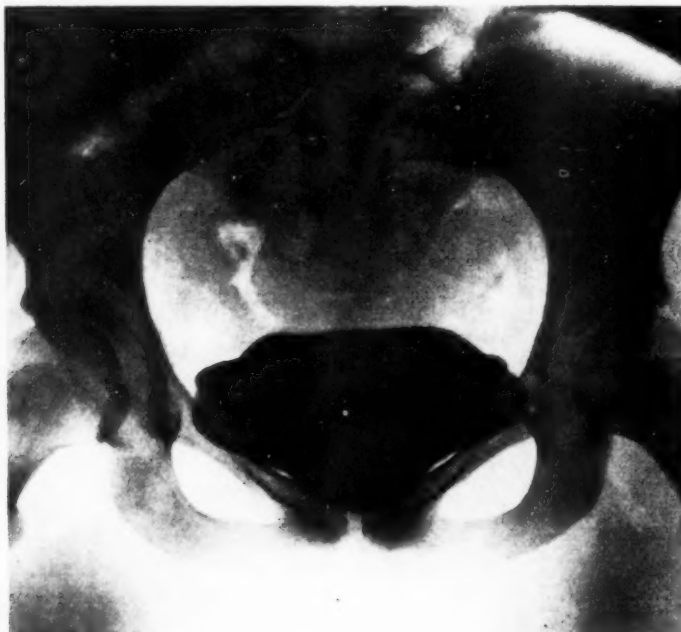


Fig. 1.—Normal bladder of a nullipara. Standing, photograph taken anteroposteriorly. Attention is called to the fact that the outline of the base of the bladder is practically horizontal and does not extend below the level of the center of the symphysis.

a definite relaxation or tear of the urethral sphincter, an attempt was made to demonstrate this fact by x-ray examination.

Technic.—Six or eight ounces of a 10 per cent sodium iodide solution is injected into the bladder through a soft rubber catheter by the gravity method. The x-ray is focused over the center of the symphysis and the exposures are made directly anteroposteriorly. Four plates are taken, two with the patient recumbent and two in the standing posture. The first exposure in each position is made with normal intraabdominal pressure, and the second is taken while the patient is "bearing down." We have employed this technic in a consecutive series of cases and in none has injury resulted. This technic in general is similar to that developed by Ferguson*. A series of normal cases was studied, particularly noting

*Ferguson, L. K.: Surg. Clin. N. Am., 1926, vi, No. 1, 79.

the change in the outline of the base of the bladder when the patients were asked to increase the intraabdominal pressure. A typical picture of the bladder of a nulliparous patient shows the outline of the base of the bladder, while the patient is "straining" forcibly. Attention is called to the horizontal line in the region of the internal sphincter. In other words, there is no apparent weakness in this area.

This picture is to be compared with Fig. 2. This patient presented a perfect anatomic result following a simple anterior colporrhaphy. The incontinence of urine, however, persisted after operation. The cystogram shows a very definite weakness of the base of the bladder on increase of intraabdominal pressure. The cone-shape of the base line is typical of that seen in all of the cases of incon-



Fig. 2.—Relaxation of the urethral sphincter. In this case a large cystocele and urethrocele were present. The former was repaired thirteen months prior to this photograph having been taken. Patient was incontinent before operation, and this symptom was not benefited despite the fact that the cystocele was cured as far as could be demonstrated by the ordinary clinical methods. The x-ray shows the typical funnel-shaped appearance in the region of the internal urinary meatus.

tinence which we have examined by this technic. Fig. 3 is a case similar to the one shown in Fig. 2 and presents the same distortion of the base of the bladder.

The x-ray is also of value as a preoperative procedure. By it the surgeon cannot only demonstrate that such a lesion is present but is enabled to estimate to an extent, at least, the amount of relaxation of the sphincter which is present and is thereby enabled to perform a more efficient repair. The points which we wish to emphasize are:

(a) That a relaxation of the sphincter is a cause for incontinence, (b)

the lesion must be recognized in order to perform a satisfactory repair and so cure the incontinence, (c) that relaxation of the sphincter cannot always be recognized by the ordinary clinical methods, (d) that the x-ray offers a practically certain means of recognizing the condition and also the extent of the lesion, (e) that the x-ray may be employed as a postoperative measure in order to determine the efficiency of the operation, (f) and, finally that the x-ray is especially valuable as a means of testing the integrity of the internal sphincter in those cases which have been repaired, often with an apparently excellent anatomic result, but in which the incontinence persists.



Fig. 3.—The history of this case is similar to that shown in Fig. 2. A plastic operation was performed for a large cystocele. The incontinence, however, continued. The x-ray examination shows the typical funnel-shaped opening of the urethra indicating a dilatation of the sphincter.

Occasionally, this incontinence persists after the repair of the cystocele even when an apparently perfect anatomic result has been secured. In the latter group of cases, if the technic of Ferguson* is employed, the x-ray picture will show that the internal portion of the urethra is dilated and instead of being a tube of fairly uniform diameter it is funnel shaped. The recognition of the condition prior to operation is, therefore, important.

*Ferguson, L. K.: Surg. Clin. N. Am., 1926, vi, No. 1, p. 79.

The condition may occur in two ways: (a) a direct tear during delivery, or, (b) from the constant dragging upon the sphincter due to the presence of a cystocele which finally results in the weakening, relaxation, and dilatation of the sphincter and the development of partial incontinence. This latter method of development is by far the most common. This relaxation of the sphincter should not be confused with the localized hypertrophy of the vaginal mucous membrane which occurs in the same region and is such a common accompaniment of a cystocele. The latter has no relation to the integrity of the sphincter. The funnel-shaped appearance of the urethra, as observed in the x-ray pictures, is characteristic of the former condition and is absent in uncomplicated cystoceles.

Various operations have been devised for correcting the relaxation of the sphincter. Our own plan is to carry the denudation of the anterior wall well forward to the urethra, to, at least, 1.5 or 1 cm. of the external urinary meatus and shorten the relaxed sphincter by three or four carefully placed fine catgut sutures, as shown in the diagram.

CONCLUSIONS

1. Relaxation of the anterior wall is of frequent occurrence.
2. These lesions frequently develop gradually and often occur in patients in whom there has never been any demonstrable tear in the vaginal mucosa.
3. Cystocele is much more frequent in stout than in thin women. It is probable that the intraabdominal pressure is decidedly greater in the former than in the latter type of patients.
4. Partial incontinence, especially upon straining or coughing, is one of the most frequent and annoying symptoms of the condition.
5. Incontinence is rarely, if ever, present unless the sphincter is injured.
6. A definite differentiation between the two lesions should be made.
7. When the sphincter is involved, partial incontinence is a frequent accompaniment. Although commonly concomitant, these lesions are not necessarily so, and incontinence may be a marked symptom in a case in which the actual vesical lesion is relatively insignificant.
8. The reverse may also be true. A large cystocele may be present and if the urethra is intact, incontinence is not likely to be present.
9. Relaxation of the sphincter may be easily demonstrable. In many cases its presence can be detected by directing the patient to strain or cough. In some instances, it is much more difficult to determine, and this is especially likely to be the case when the base of the bladder is in relatively normal position.
10. Not infrequently the vaginal mucosa covering the posterior portion of the urethra becomes hypertrophied. This hypertrophy may

exist alone but is a common accompaniment of a cystocele. This hypertrophy bears no relationship to the integrity of the sphincter.

11. The fluoroscopic examination or x-ray pictures taken with the bladder filled to capacity with an opaque liquid, as previously described, is a direct aid in demonstrating these lesions.

12. Relaxations of the sphincter may be demonstrated by the x-ray which cannot be detected by the ordinary clinical methods.

13. To cure incontinence due to relaxation of the sphincter, its presence must be recognized and the anterior colporrhaphy modified accordingly.

14. Lack of attention to this detail may result in an apparently excellent anatomic result with, however, failure to relieve the incontinence.

15. Postoperative x-ray examinations are of great practical value in determining the degree of restoration secured.

16. No one type of operation is applicable to all cases if the best results are to be secured.

17. The selection of the type of operation and previous knowledge of the actual lesion present is of the utmost importance.

18. Care in the performance of the operation is equally important. Absolute hemostasis is essential. A small hematocoele, insignificant in itself, may result in failure to secure a symptomatic cure as may carelessness in the placing of one or two of the important sutures.

TWENTY-SECOND AND CHESTNUT STREETS.

(For discussion, see page 743.)

FISTULA OF THE UTERUS

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FISTULA of the uterus occurs with relative infrequency following operations on the uterus and adnexa. Sixteen cases have been observed at the Mayo Clinic, including only those in which there was a communication, either direct or through a fallopian tube, between the uterus and the abdominal wall. Fistulous tracts leading from the uterus to other organs or to the surface of the body in situations other than the abdominal wall, are not discussed here.

SYMPTOMS

The symptoms of fistula of the uterus are characteristic, indeed almost pathognomonic. Following operation complete healing fails to occur or primary healing apparently occurs, and later an area of fluctuation, usually coincident with a menstrual period, appears. In

some instances there is malaise and elevation of temperature until the fistula is definitely established. When such an area of fluctuation does not rupture spontaneously, or is not incised when it first appears, it may temporarily decrease in size. With the onset of succeeding menstrual periods more fluid accumulates and is eventually released by spontaneous rupture or surgical drainage. The fluid which escapes is blood-tinged. Menstruation occurs subsequently both by the normal route and through the fistula.

The amount of blood discharged through the fistula varies depending on the size of the opening, the amount of menstrual flow, and the relative patency of the cervical canal. During the intermenstrual period the discharge becomes serous or purulent and diminishes. In an occasional case in which there is little inflammation, the fistula may show a tendency to close between menstrual periods.

Complications may modify these symptoms slightly. The fistula may communicate with viscera other than the uterus. Such a communication with the intestine results in the escape of gas and fecal material. If there is a communication with bladder or ureter, urine may pass through the fistula. Foreign bodies in the pelvis that act as a focus in some of these fistulas may be discharged piece-meal to the surface and be noted by the patient.

Sinuses that extend down to, or only partially penetrate, the uterine wall are not associated with periodic discharge of blood, such as occurs with true fistulas of the uterus.

DIAGNOSIS

The diagnosis of fistula of the uterus usually depends on the existence of a postoperative abdominal fistula which periodically discharges blood coincident with menstruation. Such a condition is found in the presence only of one other lesion: a postoperative fistula communicating with an area of misplaced endometrial tissue in an extrauterine adenomyoma or hemorrhagic cyst of the ovary as described by Sampson, discharging blood coincident with menstruation. This condition is so rare that it need hardly be considered. In Shaw's case, which he believed to be the only one of its kind reported in the literature, exploration had been carried out in 1914 and double uterus diagnosed. Ten years later a fluctuating mass appeared in the right groin; it was incised, and black tarry fluid escaped. A fistula persisted and discharged blood coincident with menstruation for four months. At the second operation, in 1924, hysterectomy and bilateral oophorectomy were performed. A mass in the round ligament, with which the fistula communicated, was not removed because of technical difficulties and because it was believed to be an adenomyoma which would atrophy after removal of both ovaries. After operation the fistula closed spon-

taneously and the patient was entirely well six months later. Examination of the right ovary disclosed adenomyoma.

The diagnosis of fistula of the uterus may be confirmed by the introduction of colored fluid into the fistula and observing its escape through the cervix. When the tract is not tortuous, a sound or probe introduced into it may be brought out through the cervix, or a metallic click may be elicited by the approximation of the ends of two sounds, one of which is introduced in this manner through the fistula and the other through the cervix. If substances opaque to roentgen rays are injected through the fistula they should produce a roentgenographic shadow sufficiently characteristic to suggest communication with the uterus.

In other abdominal fistulas there may be bleeding from granulations, and there may be some increase in the amount of bleeding from congestion coincident with menstruation, but in such fistulas the blood is bright red and scanty and association with menstruation is not constant. That they do not communicate with the uterine cavity can be conclusively demonstrated with sounds and the use of colored fluids.

ETIOLOGY

In all of the cases discussed here formation of the fistula dated from an operative procedure. The primary operation consisted of partial or complete salpingectomy or salpingo-oophorectomy on the side on which the fistula developed in seven cases, oophorectomy alone in one case, oophorectomy and partial resection of the uterus in one case, appendectomy for ruptured appendix in two cases, and drainage of pelvic abscess in five cases.

TABULATION. OPERATIVE DATA IN SIXTEEN CASES OF FISTULA OF THE UTERUS

CASE	OBSERVATIONS AT FIRST OPERATION	SIGNIFICANT OBSERVATIONS AT FISTULECTOMY
1.	Acute left pyosalpinx	Adhesions of left ovary; chronic right salpingitis
2.	Appendicitis and bilateral salpingitis	Fibromyoma uterus and chronic salpingo-oophoritis
3.	Pelvic abscess	Bilateral tuberculous salpingitis
4.	Tuberculosis	Tuberculous salpingitis
5.	Pelvic abscess	Chronic salpingitis
6.	Tuberculous peritonitis	Tuberculous salpingitis and peritonitis
7.	Ruptured appendix	Ovarian abscess
8.	Appendicitis	Tubo-ovarian abscess
9.	Indefinite	Tuberculosis
10.	Tubo-ovarian abscess	Inflammatory mass; three silk worm sutures
11.	Pelvic abscess	One silk worm suture; slight inflammation
12.	Pelvic abscess	Chronic salpingitis; nonabsorbable sutures
13.	Tuberculous peritonitis	Chronic salpingitis
14.	Pelvic abscess*	
15.	Ruptured extra-uterine pregnancy	Inflammatory mass
16.	Ruptured appendix	Tubo-ovarian abscess

*No operation.

Tuberculosis of the tube or ovary was diagnosed at operation in five cases and in two there was generalized tuberculous peritonitis. In three of the eleven nontuberculous cases nonabsorbable suture material was removed at the second operation.

Operations performed during the acute stage of pelvic infection or during the abscess stage are usually necessarily incomplete and are often limited to drainage. It was usually following such operations that fistulas developed. In only one case did the fistula develop following salpingectomy for extrauterine pregnancy; at a second operation there was evidence of infection. Fistula secondary to cesarean section was not observed in the series. Tuberculous inflammation, characterized by its tendency to fistula formation, especially following operative procedures, was the second most common etiologic agent. Nonabsorbable suture material used in the presence of infection was third in order of frequency as the cause of the fistula. Sutures of this type may be used with impunity in the pelvis when infection is absent but in the presence of infection they are contraindicated.

PROGNOSIS AND TREATMENT

The prognosis with regard to spontaneous closure of fistula of the uterus after cessation of menstruation at the menopause could not be determined from this series inasmuch as the ages of the patients made it inadvisable to delay operation until such time. It would appear that the outlook for closure could be fairly accurately predicted by the amount of discharge present during the intermenstrual periods and the tendency of the fistula to close at such times. Inasmuch as there is extensive inflammation, tuberculosis, or foreign body present in practically every case, spontaneous closure cannot be anticipated in the majority of cases and surgical interference is usually indicated.

The operative procedures consist of dissection of the fistulous tract and removal of any inflammatory tissue or foreign body that may be present. If the tract communicates with the uterus through either fallopian tube, salpingectomy should be performed and the opening into the uterus closed. If the fistula leads directly into the uterus, the intramural portion of the tract should also be removed and the opening into the uterus carefully closed. The round ligaments, or other tissue which are easily mobilized, may be utilized to cover the defect in the wall of the uterus. Absorbable suture material should be used throughout. In the presence of extensive inflammation involving the uterus hysterectomy may be necessary.

A fistula should not be considered surgically until at least six months have elapsed. During this time spontaneous closure may occur or, if the fistula persists, time is provided for the establishment of maximal local and general immunity to infection. Just before the menopause

surgical interference may be postponed in selected cases to permit possible spontaneous closure after the cessation of menstruation.

The patient's poor general health and the presence of multiple fistulas or complicating intestinal or urinary fistulas add to the risk of operation and should be considered before operation is decided on.

The operative mortality is low. In the series of cases discussed here, radical operation was performed in fifteen with no mortality. The factors contributing to safety in these cases are: (1) involvement of the pelvic peritoneum with its relatively high resistance to infection; (2) the fact that infection has usually been present long enough to establish maximal immunity, and (3) the fact that the type of infection present is usually of low virulence and tends to become chronic.

The results obtained following radical resection of the fistula and removal of inflammatory tissue are highly satisfactory. Complete and permanent closure was obtained in twelve of the fifteen cases. In one case there was still slight drainage when the patient was last heard from, three months after operation; one case was recent and in one case there was no record of the postoperative course.

Endometritis associated with open fistula is usually sufficient to prevent conception but subsequent to elimination of the fistula and the infection, conception may occur provided other pathologic processes or operative procedures are not sufficient to cause sterility. In this series of cases pregnancy did not occur in the presence of an open fistula. One patient became pregnant four times subsequent to elimination of the fistula; each pregnancy terminated in a normal delivery and there were no miscarriages.

SUMMARY

Fistula of the uterus is relatively infrequent as a postoperative complication. The diagnosis can be made almost entirely from the existence of a postoperative abdominal fistula which periodically discharges blood-tinged fluid coincident with menstruation. Operations in the presence of acute pelvic inflammation, abscess or tuberculosis, especially when they involve the incomplete removal of the inflammatory tissue, and the use of nonabsorbable suture material, are the outstanding causes of the formation of fistula of the uterus. Radical surgical removal of the fistulous tract, inflammatory tissue, and foreign bodies, when present, is usually indicated. This procedure is attended by a low mortality rate and good results.

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THE METABOLISM OF GALACTOSE*

IV. THE EFFECT ON THE TOLERANCE OF THE LEVEL OF OVARIAN ACTIVITY

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IN A PREVIOUS paper¹ one of us established as facts: (a) that in health there is a well-defined and limited tolerance in man for galactose, and (b) that there exists an intrinsic sex difference in the adult assimilation limit. In later papers dealing with the effect of disease on the tolerance² and summarizing the general results of the study,³ we have touched upon the fact that the female assimilation limit shows variations which are seemingly determined by the several levels of ovarian activity.†

The status of the ovary during fetal, infantile, and prepubertal life may be regarded as qualitatively the same.

Under usual conditions, the next three decades or more see a rhythmic repetition of this act of ovulation, followed by corpus luteum formation, and subsequently by menstruation, determining a series of what are frequently termed false pregnancies. Only if the liberated ovum becomes impregnated does this rhythmic function cease, being supplanted by the equally characteristic sequence of pregnancy, parturition, and lactation. Coincident with the termination of the latter phase, or more frequently prior to its cessation, unless a new impregnation has taken place the menstrual rhythm is resumed. Naturally, the above connotes the existence of health and normality of function. Manifold disease conditions may interfere with the initiation or completion of any one of the several stadia. Under normal conditions, however, this rhythmic progression continues, possibly interrupted by pregnancies, for the period of active maturity.

The third and last phase is determined by the cessation of ovulation and its attendant phenomena, the so-called menopause which initiates the retrogressive changes of senility. The ovaries become fibrous in character with a disappearance of follicles of corpora lutea and in the senile organ, of the interstitial cells. Parallel changes occur in the genital tract and in the secondary sex characteristics.

Inevitably, in recent years these various modifications during the three major periods of life have been regarded as controlled and regu-

*For lack of space certain portions of this article could not be printed, but the complete paper may be had in the authors' reprints.

†As has already been shown, the male tolerance in health remains unchanged throughout the life span and is unaltered by castration in adult years.

lated by internal secretory activities. In the ovary itself at different times, there are three potential sources in the follicle, the corpus luteum and the interstitial cells, while in the phase associated with reproduction, individual effects have been referred to the uterus, placenta, fetus, and mammary glands. Current thought is by no means unified as to the rôles played severally by each of these potential agencies, nor in fact is there agreement as to the endocrine character of all of them.

With this brief exposition we may now turn to a consideration of the influence of the apparent levels of ovarian activity upon the carbohydrate metabolism. The attention of the reader, in this connection is drawn to the fact that at certain phases of existence the mammary glands of the female presumably possess the power of synthesizing galactose from glucose (a stereoisomeric rearrangement), of conjugating the two sugars to form lactose, and of storing the product, and probably the intermediate materials.*

METHODS

In general, the subjects of these studies were patients admitted to the diagnostic service of the Evans Memorial. During a residence of seven or more days they followed a schedule of intensive clinical and laboratory investigation which has been fully described elsewhere.¹⁰

It was thus possible to rule out other agencies which might influence the sugar tolerance. In addition, normal volunteers were accepted whenever they could be secured and given the same general study, but the enforced hospital stay was a serious deterrent in the adult groups. The sugar test was applied by the familiar technic with due observance of all necessary precautions.¹¹ The tolerance dose, as reported, is that amount which will excite a slight transitory melituria, while a test meal a few grams (usually 10) less in amount is negative. Weight deviations, as reported, are the means of the Dreyer¹² and West¹³ comparisons, restricting the former to the prediction based upon sitting height.¹⁴ Alveolar carbon dioxide tension was measured by the Fredericia method,¹⁵ and the blood sugar by that of Folin-Wu.¹⁶ The respiratory metabolism was determined by the closed circuit method, measuring the oxygen consumption by a Benedict-Collins¹⁷ spirometer. Comparisons were made with the predictions both of the Harris-Benedict¹⁸ and Aub-duBois¹⁹ standards, and the mean reported.

PREPUBESCENT

But few references in the literature giving comparable observations are available. Schirokauer²⁰ reports some observations indicating a

*This latter assumption is not essential but as the synthesis of galactose seemingly represents an intracellular activity, there must be a minimal concentration of the sugar constantly in the active glandular structures.

TABLE I. PREPUBESCENT

NO.	AGE (YR.)	WEIGHT DEV.	ALV. CO ₂ (MM.)	BASAL RATE DEV.	BL. SUGAR (MG.)	GALACTOSE TOLERANCE	REMARKS
1	8	-16%	36	-3%	84	20	Normal Control
2	9	-10%	49	-11%	105	20	Normal Control
3	9	-14%	36	+1%	86	20	Normal Control
4	9	-5%	36	-7%	91	20	Underdeveloped
5	10	-12%	40	-2%	109	20	Normal Control
6	10	-13%	38	-3%	80	20	Normal Control
7	10	-22%	39	-12%	101	20	Underdeveloped
8	11	-10%	36	-11%	110	20	Normal Control
9	11	+7%	39	-11%	100	20	Feeble-minded
10	11	+15%	40	-6%	100	20	Normal Control
11	12	-12%	49	-7%	100	20	Normal Control
12	12	-20%	38	-10%	104	20	Normal Control
13	12	-20%	42	-2%	99	20	Normal Control
14	13	+5%	36	± 0%	77	20	Incipient Tuberculosis?
15	13	-20%	40	-1%	110	20	Normal Control
16	14	-14%	36	-11%	109	20	Normal Control
17	14	-18%	34	+2%	98	20	Feeble-minded
18	14	-5%	44	-3%	87	20	Feeble-minded
19	16	-15%	32	+10%	110	20	Underdeveloped
Average		-11%	39	-5%	99	20	

tolerance level at about 20 grams. Göppert²¹ fixes the tolerance for children from two to four years old as about 15 grams.

The majority of our children were normal controls drawn from institutional sources. The data are collected in Table I.

But little comment is necessary. The group shows a definite tendency to underweight, only two of the children being above prediction. An examination of the Sitting Height Index shows an average value of 0.531. This is substantially normal and indicates an applicability of the Dreyer standards, though as these children did not have the mature female configuration, the underweight values represent maxima. So far as could be ascertained, this emaciation represented a normal habit; at least there had been no rapid loss of weight. In every case they were on a liberal controlled diet for at least four days before beginning the test. Finally, a partial inanition for carbohydrates would tend to raise rather than lower the assimilation limits. Six of the group showed basal rates on the lower borderline of normality. The standards at this age lack the clarity of definition which obtain with adults, and in no case was there other evidence of hypofunctional derangement. The uniform response of the group to a 20-gram test meal with equally uniform negative result with 10 grams, would seem to fix the prepubertal level at about this point.

PUBESCENT

The composing members of this group lack the sharp outline of the previous section. We have experienced the greatest difficulty in securing subjects at this interesting and important stadium of development.

Two of the children had not menstruated but both gave physical signs of a probable early onset.* Case S-909 is included here although there is no real warrant for so doing. She was a girl of twenty-one years of mature feminine contour, who had never established the catamenia. Although she was undersized (4 feet 8 inches), her general picture was one of normalcy. The sitting height index was 0.528, a fully normal value, and the lung capacity was above prediction. The blood pressure was low (102/58). The urine picture was normal with the sole exception of a high (11.8 per cent) residual nitrogen fraction. Blood chemistry was strictly normal, and beyond a lymphocytosis of 45 per cent, the blood morphology was the same. The pelvic report is given verbatim: "The external genitalia are poorly developed; a sparse growth of hair is present. The hymen is intact. Rectal examination was made and pelvic parts were impossible to define. There was, however, poor cooperation on the part of the patient." With her tolerance threshold of 30, this patient could equally well be a pseudohermaphrodite with external female habitus and undescended testicles. The data are given in Table II.

TABLE II. PUBESCENT

CASE NO.	AGE (YR.)	MENST. AGE	WEIGHT DEV.	ALV. CO ₂ (MM.)	BASAL RATE DEV.	BL. SUGAR (MG.)	GALACTOSE TOLERANCE	REMARKS
C-18	10	0 ¹	-10%	32	-12%	96	30	Deaf
B-400	12	12 mo.	+18%	43	- 2%	93	40	Congenital Hip Disease
B-382	13	6 mo.	-22%	38	- 7%	87	30	Congenital Leg Deformity
B-424	13	0 ¹	+28%	41	± 0%	87	30	Physiologic Obesity
B-622	13	6 mo.	-13%	42	-10%	88	30	Chorea
C-33	14	6 mo.	-22%	36	- 7%	91	30	Arthritis
S-909	21	0 ²	+20%	39	+10%	105	30	Prematurity. Phys. Retard.

¹Had not menstruated but all physical signs indicated speedy approach.

²See text.

Here again but little comment is necessary. The one child who had menstruated for a year had a tolerance of 40 grams. All of the others with a catemenial history of less than six months' duration were at 30 grams. At this period there must be a gradual transition to the mature state which seemingly is marked by a progressive upward trend of the assimilation limit. It would have been interesting to make a detailed study of this period but the poverty of available material has so far rendered this impossible.

*One of them menstruated two months later. We have been unable to regain contact with the other.

TABLE III. MENSTRUAL INFLUENCE

CASE	AGE (YR.)	MENSTRUAL HISTORY		WEIGHT DEV.	INTERMENSTRUAL PERIOD				MENSTRUAL PERIOD			
		ONSET	REG.	DUR.	B. M.	CO ₂	BL. SUGAR	GAL. TOL.	B. M.	CO ₂	BL. SUGAR	GAL. TOL.
Ca	37	12	Reg.	4 day	-1%	44	114	50	-2%	44	100	40
N	23	12	Reg.	4 day	-16%	35	93	40	-	39	100	35
MM	23	13	Reg.	4 day	-9%	42	97	40	-9%	45	98	30
MG	28	14	Irreg.	5-6 day	+1%	40	116	40	+0%	38	97	30
S	25	14	Reg.	6 day	-10%	38	100	40	-10%	45	100	20
Cr	27	13	Reg.	5 day	-6%	38	87	30	-3%	37	103	30
G	21	13	Reg.	5 day	-5%	47	100	30	-9%	37	100	20
R	22	12	Reg.	4 day	-1%	39	97	30	-10%	42	95	20
No	22	12	Reg.	4 day	-11%	35	93	20	-7%	39	100	20
H	24	15	Reg.	4 day	-6%	45	91	20	-9%	45	100	20
F	30	13	Reg.	5 day	-5%	34	87	20	-15%	39	100	20
T	25	13	Reg.	5 day	-13%	39	100	20	-17%	39	95	20

MATURITY

The level of tolerance of the adult female in a state of sexual rest has already been established at 40 grams.²⁴

MENSTRUATION

The effect of menstruation on the sugar tolerance has already been the subject of investigation. Okey and Robb²⁵ found no evidence of a cyclic variation in the level of blood sugar. They find a greater variability during the period than at any other time, though the average values are slightly higher. Using the Janney and Isaacson²⁶ technic, they secured blood-sugar curves (10 subjects) indicating a somewhat increased tolerance during menstruation. Küstner²⁷ notes a premenstrual glycosuria which is of short duration and which he ascribes to the presence of a functioning corpus luteum. His observation that the glycosuria of pregnancy disappears as confinement approaches, supports his thesis, but is in but poor agreement with the reports of numerous other observers. Hoffman,²⁸ using blood-sugar curves, notes that the tolerance for galactose (and for other sugars) is raised during menstruation. His statement that the tolerance limit for this sugar is probably 15 grams, naturally raises some question as to his other conclusions.

The study here reported was carried out with twelve volunteers. Several of them gave evidence of endocrine dysfunction and were purposely included. The galactose tolerance was determined in the middle of the interspace and again during the period. Adequate precautions were taken to prevent contamination of the latter collections. A variety of other measurements were made, some of which are reported.

The data presented show a number of interesting facts. In the first place, seven of the women showed a fall in tolerance (usually of 10 grams), while five exhibited no change. All of the latter had an initially low tolerance, four of them being at the prepubertal level while the fifth was intermediate. Those with the higher assimilation limits all showed a drop, as did two of the three at the slightly subnormal level of 30 grams. This lack of agreement with the reports given above undoubtedly derives from the difference in methods employed. One of us has already shown the independability of the shape of the blood-sugar curve as a quantitative index.²⁹ From the figures given above it is safe to say that the assimilation limit for galactose usually is depressed during menstruation if the subject be initially above the minimum level observed in prepubertal years.

MENOPAUSE

Coppioli,³¹ in an article to which we have been unable to secure access, is quoted as finding a lowered tolerance for levulose in aged women.

TABLE IV. POSTMENOPAUSE

CASE NO.	AGE (YR.)	MENOPAUSE AGE	INTER.	WEIGHT DEV.	ALV. CO ₂ (MM.)	BASAL RATE DEV.	BLOOD SUGAR (MG.)	GALACTOSE TOLERANCE	MARITAL HIST. PREG.	CHIL.	REMARKS
a. Postmenopause—Married											
B-729	45	35	10	+18%	42	-15%	105	40	1	0	Arthritis
B-700	46	37	9	-4%	42	-15%	91	30	1	0	Cardiorenal
B-422	48	43	5	-4%	-	-17%	100	30	4	3	Neurosis
S-1068	49	41	<1	+16%	41	-12%	100	30	2	2	Essential Hypertension
B-771	50	50	few months	+9%	46	-11%	97	30	3	3	Hypertension
B-461	51	43	8	+15%	43	+2%	94	30	3	2	Early Renal
B-645	51	50	1	+6.5%	41	-11%	125	40	3	3	Arthritis
B-239	52	51	1	+17%	34	-11%	97	40	4	4	Neurosis
B-386	53	53	<1	-6%	43	-9%	100	30	4	4	Psychoneurosis
B-173	53	50	3	-9%	37	-8%	104	30	2	2	Early Renal
B-541	53	43	10	+8%	35	-7%	94	30	3	3	Neurosis
B-345	53	39	14	+4%	35	-6%	114	30	1	1	Neurosis
B-200	55	39	16	+16%	29	-1%	68	30	4	3	Renal
B-647	56	53	3	+55%	42	-12%	118	30	15	10	Arthritis
B-500	58	52	6	+4%	(34)	-9%	91	30	4	4	Psoriasis
B-468	60	49	11	+13%	35	+3%	-	30	2	1	Arthritis
B-597	60	40	20	+5%	38	+2%	96	30	1	1	Eczema
B-357	62	50	12	-7%	42	+3%	93	40	6	4	Erythema multiforme
B-115	65	49	16	+14%	22	+2%	129(?)	30	1	1	Early Renal
S-395	70	50	20	-1%	29	-10%	103	40	2	2	Essential Hypertension
b. Postmenopause—Unmarried											
B-93	45	45	<1	+42%	38	-10%	86	30	-	-	Head Trauma
B-800	46	45	1	-14%	-	-2%	81	30	-	-	Neurosis
B-665	48	47	1	-22%	43	-3%	100	30	-	-	Putmonary T. B.
B-360	48	44	4	+6%	42	-5%	92	30	-	-	Essential Hypertension
B-191	50	47	3	-19%	(28)	-2%	118	30	-	-	Neurosis
B-518	53	52	1	-7%	40	-14%	100	30	-	-	Non-specific Lesion of Central Nerv.'s System
B-802	53	47	6	+2%	40	-6%	89	30	-	-	Essential Hypertension
B-365	55	46	9	-7%	44	-6%	97	40	-	-	Neurosis
B-368	55	46	9	+5%	38	-13%	92	30	-	-	Gout
B-114	64	45	19	-1%	44	+12%	92	30	-	-	Neurosis
B-763	64	50	14	+12%	43	-6%	100	30	-	-	Gastrointestinal Disorder

Stolper³² found twenty-four women in a group of thirty-nine past the menopause who exhibited transitory glycosuria after the administration of 100 grams of glucose. Premenopausal controls were negative with this dosage. Beyond these meager records the literature seemingly contains no parallel observations. The data of this series are given in Table IV.

The general tendency is downward, but only to a point midway between the mature and prepubertal levels. Several of the patients show an unchanged tolerance that in no instance can be referred to serious impairment of kidney function. That the kidney may show a lessened permeability in advanced nephritis, has been commented on elsewhere (Rowe, *l.c.*).

CASTRATION

Di Fillippi,³³ using bitches, and more recently Tsurbura,³⁴ with rabbits, have noted a fall in sugar tolerance after castration. Artom³⁵ finds opposite results, using bitches and invert sugar. M. Parhon,³⁶ notes that the glycogen content of the liver and muscles of castrated animals falls far below that of the intact. We have found but one directly comparable record in the paper by Stolper already cited. This author reports a group of women negative to 100 grams of glucose before operation and usually positive after castration (16 positive in 19 cases and two others with a polyuria which rendered the tests indeterminate). He notes that partial castration also tends to lower tolerance. The data from our series of castrated women are collected in Table V.

The data given in Table V leaves but little doubt as to the effect of castration on the galactose tolerance. With but two exceptions, all exhibit the prepubertal level of 20 grams. One of the exceptions, a woman of forty-three, had been castrated twenty-two years before. The possibility of an incomplete operation cannot be excluded. The other case showing a normal postmenopausal level was that of a woman of sixty-four years who had been castrated less than a year before. To balance this, Case S-1074, who was four years older and had also been operated upon a year earlier, showed the characteristic level. The usual influence on the basal rate is apparent. The nervousness that is characteristic of the gonad failure from whatever cause is manifest in the few cases showing normal values, and lack of basality was noted at the time of the test. A downward trend to the alveolar carbon dioxide is apparent, but equally it falls short of that shown in pregnancy.

CASTRATES WITH OTHER ENDOCRINOPATHY

While a depression of ovarian function either through ablation or, as will be discussed later, through disease, produces a lowering effect on the carbohydrate assimilation limit, other endocrine glands also play a

TABLE V. CASTRATES

CASE NO.	AGE (YR.)	CASTRATION AGE	INTERNAL	COND.	MARITAL	PREG.	WEIGHT DEV.	ALV. CO ₂ (MM.)	BASAL RATE DEV.	BLOOD SUGAR (MG.)	GALACTOSE TOLERANCE	REMARKS
S-147	24	23	1	U	U	-	- 13%	26	(+9%)	100	glycos.	B.M. too high ¹
S-148	33	26	7	U	U	-	+ 4%	30	-10%	90	20	
S-329	38	37	1	U	U	-	- 14%	28	- 3%	105	20	
B-222	39	37	2	U	U	-	- 11%	29	(-2%)	100	20	B.M. too high ¹
S-197	42	38	4	U	U	-	+ 14%	35	-17%	91	20	
B-336	43	21	22	U	U	-	- 2%	38	-19%	103	30	
B-706	48	46	2	M	M	5	+ 12%	42	-15%	88	20	
S-606	48	35	13	M	M	4	+ 74%	41	-11%	113	glycos.	
S-1568	49	23	26	M	M	0	+ 21%	38	-23%	87	20	Married after op.
S-451	50	34	16	M	M	5	+ 8%	39	- 9%	95	glycos.	
S-423	50	36	14	U	U	25	+ 0%	39	-11%	100	glycos.	
B-664	51	44	7	M	M	-	- 5%	44	+ 5%	80	20	Many abortions
B-396	51	35	16	M	M	1	- 33%	38	-14%	81	20	
B-50	51	23	28	M	M	2	+107%	36	-17%	113	20	
B-176	52	48	4	M	M	4	+ 4%	24	(+4%)	97	glycos.	B.M. too high ¹
S-913	58	53	5	U	U	-	- 1%	39	- 9%	100	20	
B-483	58	38	20	U	U	-	- 13%	39	- 9%	84	20	
S-261	59	42	17	M	M	0	+ 18%	34	-15%	91	20	
B-537	64	63	<1	M	M	2	+ 7%	36	- 9%	100	30	
S-1074	68	67	1	U	U	0	- 6%	40	-21%	84	20	
Ga	22	22	few days	M	M	1	-	-	-	91	30	
An	26	26	"	M	M	1	- 31%	32	- 5%	100	30	
Pi	36	36	"	M	M	9	- 7%	40	-12%	118	30	

¹Patient nervous and restless. Test not basal.

TABLE VI. PLURIGLANDULAR INFLUENCE

CASE NO.	B-2	S-744	S-1327	S-1343	B-659	B-109	B-599	B-662
Gland	P-	P-	P-	P-	P-	P-	P-	P-
Age (yr.)	45	45	35	48	65	50	54	41
Age of Castration	29	39	32	42	52	32	20	30
Interval	16	6	3	6	13	18	34	11
Condition	M	M	M	M	M	M	M	M
Pregnancies	5	8	1	2	0 ²	3	0 ¹	13
Weight Dev.	-	12%	-5%	-1%	-52%	-14%	+31%	-8%
Alv. CO ₂ (mm.)	-	34	37	44	43	32	40	42
Basal Rate Dev.	-	-23%	-10%	(-7%) ³	-20%	-30%	-21%	-25%
Blood Sugar	-	87	118	100	83	68	87	88
Galactose Tolerance	50	30	40	40	60	20	30	30
Deviation	+150%	+50%	+100%	+100%	+200%	±0%	+50%	+50%

¹Married after castration.²Separated shortly after marriage.³Not basal. Patient nervous.

part in the regulation of sugar metabolism. A few so-called pluriglandular cases have been selected from the series to illustrate the double effect. It will be understood that the polyglandular character of these cases rests upon an independent endocrinopathy superimposed upon that produced by castration. The pluriglandular syndrome of purely functional origin is a condition of utmost rarity, if, indeed, it exists at all. The data of a few typical cases are shown in Table VI.

Castration produces a normal tolerance of 20 grams. In the five pituitary failures (posterior lobe), the average increase is +120 per cent, with one case showing a tolerance 200 per cent above the normal castrate level. The three thyroid cases, on the other hand, show an average of +33 per cent. These relative values are in conformity with those derived from long series of cases presenting uncomplicated pituitary and thyroid failures. The effect is patently an additive one.

The influence of functional failures of the ovaries on the assimilation limit will shortly be discussed at length elsewhere by one of us (Rowe). It is sufficient to say here that in 200 cases of functional hypogonadism in adult females, 160 showed a tolerance threshold of 20 grams, while the 40 remaining cases were positive with 30 grams. Four additional cases, showing levels less than 20 grams were severally syphilis (2), liver disease (1), and brain tumor (1); all conditions that have been shown to lower sugar tolerance. Severe functional failure, then, duplicates the influence of castration on the power to utilize galactose, while less severe functional disturbances show a trend which differs only in degree.

It will be noted first that in this discussion the highly important stadia of pregnancy and lactation have been omitted. In them the mammary glands play a part in the carbohydrate metabolism sharply differentiated from the several phases (with the possible exception of menstruation) discussed here. These questions are to be considered in a subsequent paper. In Table VII several relationships are schematically presented. From the standpoint of the Frank theory, the

TABLE VII. GENERAL RELATIONSHIPS

STADIUM	SUGAR TOL.	ENDOCRINE AGENT			STORAGE CAPACITY OF BREASTS
		FOLL. HOR.	COR. LUT.	INT. CELLS	
Prepubescence	Low	0	0	+	Low
Pubescence	Increase	+	+	+	Increase
Maturity	High	+	+	+	High
Menopause	Decrease	0	0	+ to 0	Decrease
Menstruation	High	} late 0 early +	} early 0 late +	+	High
Interspace					
Period	Decrease	0	+	+	Increase ?
Castration	Decrease	0	0	0	Decrease
Function Failure	Decrease	+	+	+	? (probably decrease)
Breast Ablation	Decrease	+	+	+	None

follicular hormone and that of the corpus luteum are identical, and but one column would be necessary. As other observers have recorded active extracts from the corpus, the method adopted is to be preferred.

Summarizing, we find that with the sole exception of the anomalous relationship during the menstrual period, the fluctuations of the sugar tolerance follow qualitatively those of the storage capacity of the breasts, either demonstrated or assumed.

Assuming then that the sugar tolerance is determined qualitatively by the mammary glands, we inevitably reach the conclusion that this is but a secondary or resultant phenomenon. It will be generally conceded that hormonal influences regulate the growth changes in the breasts. Further, an exact quantitative relationship between breast capacity and sugar tolerance is lacking, as the breast changes in the menopause and subsequent to castration do not parallel the two definitely different tolerances observed in the two states. Further, castration produces the prepubertal tolerance but not the mammary glands of childhood.

Delimiting conclusions to the warrantable, the results may be summarized as follows:

SUMMARY

1. The human female, in health, has a series of definite assimilation limits for galactose, the fluctuations of which are seemingly associated with changes of physiologic activity of ovarian function.
2. Starting at a low level in prepubertal years, with the onset of puberty the tolerance rises to a level in maturity double the first, and maintains this until the cessation of the catamenia is accompanied by a recession of moderate degree.
3. To those whose level is superior to the prepubertal, the act of menstruation usually determines a slight depression in the tolerance.
4. Castration of the adult lowers the sugar tolerance to the prepubertal level, and functional failure exhibits the same tendency, the degree of the depression correlating with the severity of the impairment.

5. The mammary glands are shown to have an important but apparently secondary influence in determining assimilation limits.

6. The menstrual relationships constitute a possible exception, but presumably are more closely associated with the events of the reproductive cycle, which are not considered in this paper.

7. In the main, the results of the study are in harmony with Frank's observations and his theory of the female sex hormone. Equally, the results could be explained by other endocrine formulas wholly independent of the foregoing.

8. The interstitial glands, at least during adult years, seemingly have only a secondary influence, if any, on the regulation of galactose tolerance.

9. The reproductive phase is to be considered independently in a subsequent paper.

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A CASE OF ABDOMINAL PREGNANCY REMOVED PER VAGINAM

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ALTHOUGH there are a large number of abdominal pregnancies recorded in the literature, the condition is rare enough to still warrant publication of all cases. In addition this case is of interest from the standpoint of treatment.

Discussion of treatment in the past has had to do almost entirely with the method of dealing with the placenta. Three courses of action are possible: separation and removal, marsupialization, and leaving the placenta in situ with or without drainage.

In this connection Beck, in 1919, showed that the mortality was lower without drainage than with it, where the placenta had been left, the drainage in question being abdominal. Beck stated that it was a valued procedure of the Italians about 1895. Le Doux¹ has recently reported two cases of full-term abdominal pregnancies in which the placenta was left in the abdomen. The first one was packed and drained and the patient died on the sixteenth day with general peritonitis. The other case he closed without drainage and the patient died in a few hours from internal hemorrhage. He points out that drainage through the culdesac would seem logical and desirable. In the discussion that followed, Salatich mentioned a case where they had endeavored to extract the child by colpotomy. Both mother and child were lost and the operation was very difficult and unsatisfactory. J. A. Knock² reported a case of abdominal pregnancy a month past term with infection of the sac. The patient's condition was poor, with a temperature of 102°, a pulse of 120 and some jaundice. He plugged the sac after laparotomy and then sewed the edges to the abdominal wound and the patient recovered.

In cases where the child is still alive or where the sac is not infected the abdominal route is undoubtedly the one of choice, though the method of dealing with the placenta is always going to be a difficult problem if its attachment is such as to lead to severe hemorrhage when removed. In view of the case which I am about to report it might be suggested that removal of the child, leaving the placenta in situ and draining *per vaginam* are worthy of a trial. When one comes to deal with an abdominal pregnancy in which the sac has become infected a different problem arises. The patient is septic and her general condition is poor. Dense adhesions wall off the gestation sac from the general peritoneal cavity and to dissect down to the fetus is often a difficult task. Moreover, once that dissection is made the whole peritoneal cavity is contaminated with pus and if the placenta cannot be removed prolonged drainage is necessary. In cases of doubt regarding the differential diagnosis of ectopic and inflammatory disease most of us resort to puncture of the rectovaginal pouch because of

the danger of opening the abdomen in the presence of pus. How much more dangerous must it be with an affected abdominal pregnancy. It was these considerations that led me to operate by the vaginal route in my case.

I have found three other cases in the literature in which the fetus was successfully removed by incision of the vagina. Two of these are reported in the same journal, *Le Bull. et Memoires de la Societe Obstetricale et Gynecologique de Paris*, 1893-94. The first case was reported by Guerison. The pregnancy was at term and the child dead. He perforated and crushed the skull and then delivered. The placenta was left and drainage carried out *per vaginam*. He states that he chose his method because the head was so low in the pelvis and the child was dead. The other case was reported by Touenaint. The fetus was one of only five months' development, but it had been carried for years as a lithopedion. He extracted through an incision in the posterior culdesac. The only other case I have found was reported by C. G. Davis.³ The child died one week before term and operation was done five months later. He removed the placenta in bits and packed the cavity. A small fecal fistula appeared on the tenth day but healed.

The following is the history of a personal case:

Mrs. S., aged twenty-six, four previous pregnancies, normal. Patient seen on November 27, 1925. Last menstruation began on February 10, 1925, and was normal except that it was accompanied with more colicky pain than usual. A month later there was a slight show one day but no pain; otherwise the pregnancy appeared to advance normally until September 15, at which time she rolled over a low fence and a few minutes later collapsed. When seen by her physician her temperature was subnormal, her pulse 140 and a diagnosis of concealed accidental hemorrhage was made. She slowly recovered and two weeks later was running a slight temperature which was never above 100°. There was no evidence of fetal life after the collapse. When the patient reached her expected date and did not go into labor, three attempts at induction were made, but without success and she was then sent to the city. On examination she was pale and slightly jaundiced with a temperature of 103° and a pulse of 120. Her abdomen was the size of a seven months' pregnancy, but the fetal parts were not well defined and a tympanitic note was obtained over the abdomen. On bimanual examination the cervix was small, firm and pressed up against the pubes. Behind the cervix a large, tender, cystic swelling was bulging out the posterior fornix and the wall of the vagina. The fetal head could be felt behind the uterus. On December 2 a T-shaped incision was made in the vault of the vagina and the pus evacuated. The fetal head was then perforated and crushed. Considerable difficulty was encountered in the delivery of the anterior shoulder, but the child was eventually extracted. On exploring the cavity the placenta was found to form part of the abscess wall and any attempt at removal appeared ill advised. Accordingly the cord was severed at the placenta and a large drainage tube left in the colpotomy opening. On December 19 the patient returned home with the drainage tube still in position where it remained until January 19. Discharge had then practically ceased and the tube was removed. The patient menstruated on February

9, the flow being profuse. She also flowed more than normal in March but since then menstruation has been normal. She had gained thirty-seven pounds by the fourteenth of April and has been in good health since.

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160 BLOOR STREET WEST.

TUBERCULOUS SALPINGITIS

A REPORT OF CASES TREATED AT THE FREE HOSPITAL FOR WOMEN,
BOSTON, BETWEEN 1896 AND 1927

BY GEORGE VANS. SMITH, M.D., BOSTON, MASS.

THE following report of 63 cases of tuberculous salpingitis covers the thirty year period from October, 1896, to January, 1927, and includes all patients who had tubal tuberculosis, whether the process was localized in one or both tubes or whether the tubal process was but part of a general pelvic or abdominal tuberculosis. In but 34 instances (53.96 per cent) was tuberculous salpingitis found alone. During this same period about 13,000 abdominal operations were performed. The finding of tuberculosis in but 0.48 per cent of laparotomies and in 2.26 per cent of all tubal inflammation in a gynecologic clinic establishes this manifestation of the disease as a comparatively rare occurrence. Others have found higher percentages of tuberculosis in tubal inflammations; e.g., Williams, 7 per cent; Findley, 10 per cent; Menge and von Rosthorn, 6.2 per cent, and Penrose, 18 per cent. In every case of our series the diagnosis was made or confirmed by microscopic examination.

Age Incidence.—The youngest patient in this series was sixteen; the oldest forty-six. There were 3 patients under twenty years of age, 14 between twenty and twenty-five, 22 between twenty-five and thirty, 11 between thirty and thirty-five, 9 between thirty-five and forty, and 4 between forty and forty-six.

Marital History.—Eight patients were unmarried; 55 were married. Five gave a history of spontaneous abortion, 5 had had one child, 4 had had two children, and 5 had had three or more children. A history of never having been pregnant was given by 35 married patients (55.5 per cent of the whole series and 64.8 per cent of the married patients). The percentage of sterility among women in general is usually calculated to be between 10 and 16 per cent.

Family and Past History.—A family history of tuberculosis was given by 7 patients, of malignancy by 3. A past history of pulmonary

tuberculosis was given by 2; coughing blood by 1; pleuritis by 7; of excision of glands of the neck by 2; operation for tuberculosis of the kidney by 1; typhoid fever by 7; influenza, 2; scarlet fever, 1; rheumatic fever, 3; erysipelas, 1; malaria, 2; breast abscess, 1; and "ulcers of stomach," 2. Four had had previous appendectomy, 4 had had tonsilleectomy, and 6 had had dilatation and curettage.

Complaints.—"Pain in lower part of stomach," 42; "backache," 23; "desires children," 9; "burning on urination," 8; "swelling of stomach," 8; "painful periods," 8; "pus in urine," 7; "passes water at night," 6; "weakness," 6; "discharge from front passage," 5; "vomiting," 5; "painful urination," 4; "blood in urine," 4; "passes water often," 3; "irregular periods," 3; "falling of womb," 3; "loss of weight," 3; "fever," 3; "profuse periods," 3; "soreness in rectum," 2; "headache," 2; "pain through bowels," 1; "abscess outside of rectum," 1; "vomits blood," 1; "bearing down," 1; "pressure in pelvis," 1, and "painful intercourse," 1.

Each patient made one or more of the above complaints. In 3 of the 42 instances of abdominal pain the pain came in occasional, severe, sharp attacks while in the others it was constant, both dull and sharp and most often exaggerated before and during menstruation. In two cases menstruation relieved the pain. The duration of symptoms varied over an extreme range, from two weeks to eighteen years, most commonly from one to three years. Except for three complaints of loss of weight, three of fever, and one of vomiting blood, there were no symptoms that pointed toward lung involvement.

Menstruation.—Negative, 14; acquired dysmenorrhea, 28; acquired dysmenorrhea and metrorrhagia, 5; acquired dysmenorrhea and menorrhagia, 1; catamenia rare, scant, and painful, 1; pain just before, but relieved at start of catamenia, 1; pain after catamenia, 1; metrorrhagia, 6; menorrhagia and metrorrhagia, 2; catamenia began at age of nineteen, 1; oligomenorrhea, 2; abnormally early menopause (at nineteen and thirty-two), 2.

Other Tuberculous Findings.—Thirty-four patients showed no tuberculosis except that of the fallopian tubes. Of the others lung signs were present in 12 (19.04 per cent); the peritoneum was involved in 16, the ovary in 15, the endometrium in 14, the omentum in 3, and the mesenteric glands in 1. Ascites was present in 8 of those with peritoneal tuberculosis. Tuberculous pelvic abscess was found at operation, or developed after operation in 8 patients. One patient had tuberculosis of the urinary bladder at the time of operation; one had a fistula in ano. In 5 instances a tuberculous sinus was present or developed in the abdominal wound after operation, and closed from two months to one year later, resuture being necessary in three cases. Four years, six months after operation one patient was reported to have a fecal fistula in which no tuberculosis could be found.

Associated Pathology.—There were no peritoneal adhesions in 23 cases; i.e., tubes, ovaries and all pelvic and abdominal structures were free. The adhesions in the other 40 cases varied greatly from those that were described as tenuous, or fibrinous to the dense, diffuse, fibrous type. In 2 patients, both unmarried, the cervix protruded from the vulva in the form of a procidentia due apparently to poorly developed pelvic tissues. Fibroids were found at operation in 7 cases, an endometrial polyp in 1, hyperplasia of the endometrium in 6, adenomyoma of the uterine cornua in 1, and papillary serous cystadenoma of the ovary in 2.

Operative Procedures.—Five patients received no operative treatment beyond exploration and biopsy, the disease being widespread. Thirty hysterectomies (with bilateral salpingo-oophorectomy) were performed; two were complete, and the others supravaginal. In six cases both tubes and both ovaries were removed without hysterectomy. Various conservative operations were done in 22 instances. Of those patients treated conservatively, not one is known to have become pregnant at a later date. There were two operative deaths (3.17 per cent), from peritonitis and shock respectively.

RESULTS

Fourteen patients are untraceable.

Exploratory coeliotomy and biopsy, 5 cases. One patient is untraceable, one died of pulmonary tuberculosis one year, three months after operation, one was operated on again six years, eleven months after discharge, and is now well, ten years after her first operation; another patient has some pain in her abdomen, some flowing and discharge, but feels "pretty well" eleven years after operation. The fifth patient is alive ten years after operation.

Primary hysterectomy with bilateral salpingo-oophorectomy, 30 cases. Untraceable, 6. There was one postoperative death from surgical shock. Three died at three, four and one-half, and eleven months after operation of pulmonary, miliary, and generalized tuberculosis, respectively. One patient died two years, ten months after operation of "tuberculous complications." Another died three years, seven months after operation of "carcinoma of left ovary" (probably tuberculous abscess). A fifth patient died seven years after operation of "rheumatic heart disease," and the sixth was well except for slight flowing two years after operation, and died of "lobar pneumonia" ten years, six months after operation. There were well less than one year after operation, 6, and between one and two years after operation, 2. One patient complained of discharge and pain two years after operation. Six patients were well at three years, four years, six months, seven years, twelve and one-half years, fourteen years, and sixteen years

after operation, respectively. One patient was well except for a fecal fistula, in which no tuberculosis could be found, four years, five months, after operation.

Bilateral salpingo-oophorectomy, 6 cases. One operative death from peritonitis (1897). One patient, who had had "inflammation of the stomach and bowels" for eight years, "peritonitis" for four years, and "abscess of the colon" for one year, underwent supravaginal hysterectomy six months after removal of tubes and ovaries, had a pelvic abscess evacuated two years, three months later, and died two years, ten months later. The third patient had a mass in her pelvis one year, two months after operation, but was well four years after operation. Another patient continued to menstruate after operation (some ovary must have been left in) and complained of some lower abdominal pain which was better during menstruation, twenty-three years after operation. Her chief complaint was of persistent hot flushes. The fifth patient, with tuberculous peritonitis and ascites at the time of operation, was well nine months after operation. The sixth patient was well thirty-one years after operation.

Conservative operations, 22. Untraceable, 8. Two patients whose tubes were not considered badly damaged enough for resection or excision (biopsy was performed) were well five years after operation.

The following are brief outlines of the 12 other traceable cases.

1. One tube and ovary and part of other tube excised. Patient complained of irregular menstruation, pain in lower abdomen and much vaginal discharge seventeen years, five months postoperative.
2. Both tubes and one ovary excised. Supravaginal hysterectomy was performed three years, five months later. Patient was well seven years, ten months after operation, but died of pelvic abscess eleven years after operation.
3. One tube and ovary and part of other tube excised. Patient was well two years, eight months after operation.
4. One tube excised—bad, diffuse adhesions. Patient was operated on for acute intestinal obstruction one year, two months after operation and was doing fairly well four months afterward.
5. One tube excised. A small mass was present in the left lower quadrant three years, ten months after operation.
6. Resection of both tubes and one ovary. The patient was well three years, eight months later.
7. One tube resected and some adhesions broken up. Patient died twenty years later of "bronchial asthma."
8. Both tubes excised. Patient died sixteen years, seven months after operation of "bronchopneumonia."
9. Left salpingo-oophorectomy. Patient was well four years after operation.
10. Both tubes resected. Patient was well two years after operation.
11. Both tubes excised and a piece of ovary implanted in one uterine cornu. Patient was well nine years, seven months after operation.
12. Complaint was dysmenorrhea. Lysis of adhesions and bilateral salpingectomy. Patient not relieved. Operated on again sixteen years after first operation and now is well twenty-two years, five months afterward except for slight menorrhagia.

SUMMARY AND CONCLUSIONS

1. The finding of tuberculous salpingitis, either alone or in association with pelvic, abdominal, or thoracic tuberculosis, in less than one-half of one per cent of patients undergoing laparotomy in a gynecologic clinic, and in 2.26 per cent of all tubal inflammation, demonstrates the comparative infrequency of the disease.

2. The disease makes itself known almost exclusively in the third and fourth decades, its highest incidence being in women between the ages of twenty-five and thirty.

3. The percentage of sterility in this series is 64.8, as against a 10 to 16 percentage among women in general.

4. A family or past history of tuberculosis, or suggesting it, was given by 20 per cent of patients.

5. The patients' complaints afforded no definite clue toward making a preoperative diagnosis.

6. The duration of symptoms varied from two weeks to eighteen years.

7. There were no menstrual complaints in 22.2 per cent of patients. In 53.9 per cent acquired dysmenorrhea was present.

8. Physical signs of possible pulmonary involvement were found in 19.04 per cent of this series, although there were only 7 complaints that could be interpreted as indicating lung disease, and these were not chief complaints. Five, however, of those who had lung signs at the time of operation were well from ten to twenty-three years after operation. (One of these died of "bronchial asthma" twenty years after operation.)

9. Eleven patients, 17.4 per cent of the series, are known to have died of probable tuberculosis. Five of these 11, 7.9 per cent of the total, died of probable pulmonary tuberculosis. Only two showed pulmonary signs at the time of operation.

10. In only 53.9 per cent of cases was the disease apparently localized in one or both fallopian tubes.

11. The primary operative mortality was 3.17 per cent. Operation was probably a contributory cause of death in at least 2 other instances.

12. No later pregnancy is known to have occurred in any of these patients.

13. It is difficult to draw definite conclusions concerning treatment and its results, for some patients who, because of the extent of the disease, were only explored, or submitted of necessity, to conservative operation, were well for long periods. On the other hand, conservative operation on early or moderately severe cases did not give satisfactory results. The best long-time results were achieved by radical operation, in cases where the disease was fairly advanced but not beyond operative measures. This may have been purely coincidental.

Although operation is necessary for making a diagnosis and is undoubtedly an important part of treatment in that it removes diseased tissue, its place in relation to general health measures, such as rest, diet, and light, cannot be stated definitely, because data as to the actual living conditions of these patients have not been available.

FREE HOSPITAL FOR WOMEN.

THE OFFICE USE OF THE ELECTRIC CAUTERY IN GYNECOLOGY

BY THEODORE W. ADAMS, M.D., PORTLAND, OREGON

SO VALUABLE is the electric cauterization in the treatment of various gynecologic conditions, that it does not seem out of place to call it again to the attention of the medical profession. Hunner,¹ in 1906, was the first to advocate this form of treatment, finding it especially valuable in cases of endocervicitis with erosion. Hunner, however, used the Paquelin cautery and found it necessary in many cases to use an anesthetic. Dickinson,² in 1921, pointed out the superiority of the small nasal cautery tip, stating that this form of treatment can be applied in the office without anesthesia. In 1926 Shutter³ concluded that the electric cauterization is the best form of treatment in gonorrheal endocervicitis. In the same year Noyes and Corvase,⁴ and Matthews⁵ separately advocated its use in treating moderate cervical lacerations, especially where erosion coexists, reserving the Sturmdorf operation for the severe cases.

The material reported here is derived from 116 cases treated by this method in our office during the last three years. The pathology encountered in these cases was:

1. Cervical laceration and erosion (nonspecific endocervicitis)	30 cases
a. Plus retroversion	10 cases
b. Plus pelvic relaxation	6 cases
c. Plus general debility	5 cases
d. Plus fibroid uterus	5 cases
e. Plus chronic pelvic inflammation	3 cases
f. Plus chronic vaginitis	2 cases
g. Plus prolapse	1 case
h. Found on postpartum examination	15 cases
i. Following hysterectomy	1 case
j. Following amputation of cervix	1 case
Total nonspecific endocervicitis and laceration	79 cases
2. Chronic gonorrheal endocervicitis	16 cases
3. Nabothian cysts of cervix	13 cases
4. Gonorrheal infection of Skene's ducts	6 cases
5. Urethral caruncle	2 cases
Total number of cases treated	116 cases

Thus there were 79 cases of cervical laceration and nonspecific endocervicitis. The method of treatment was essentially that described by Dickinson.²

These cases may be divided into four groups so far as the size of the laceration and erosion is concerned: (1) no definite laceration but erosion present; (2) slight to moderate laceration with erosion, the exposed erosive area being approximately the size of a dime; (3) moderate to fairly deep laceration with erosion approximately the size of a quarter; (4) deep laceration and marked eversion and erosion.

Of the total number of 79 cases treated only 70 are available for study as 9 did not return to the office after the first treatment. Twenty-five of these fell into the first group, of which 19 (76 per cent) received one treatment, 5 (20 per cent) received two treatments and in one case three treatments were necessary. Twenty patients (80 per cent) were completely relieved of all leucorrhea and on inspection the cervix appeared to be in good condition. These patients were classified as cured. In 5 patients (20 per cent) there was either a slight persistent mucoid leucorrhea, or at the time of the last examination a small area of erosion still remained. These patients were therefore classified as improved. There were no patients in this group who were not materially helped. In the second group there were 37 cases available for study. Twenty-six (70 per cent) received one treatment and 11 (30 per cent) received two treatments. There were 31 patients (84 per cent) cured, 6 (15 per cent) improved, and no failures. Of the 6 cases falling in the third group, 2 (33 per cent) received one treatment, 2 (33 per cent) received two treatments, and 2 (33 per cent) received three treatments. Two patients (33 per cent) were cured while 4 (67 per cent) were improved. There were no failures in this group. In the last group there were only 2 cases on whom this form of treatment was tried. One received one treatment and was cured, while the other was only slightly improved after two treatments. This data is shown in Table I.

TABLE I

GROUP	NO. CASES	NO. TREATMENTS			CURED		IMPROVED	
		1	2	3	NO.	PER CENT	NO.	PER CENT
I.	25	19	5	2	20	80	5	20
II.	37	26	11	—	31	84	6	16
III.	6	2	2	2	2	33	4	67
IV.	2	1	1	—	1	50	(1) 1	50
Total	70	48	19	4	54	77	16	23

There were 16 patients suffering from chronic gonorrheal endocervicitis. Positive smears were obtained in all cases before treatment was started. Patients were considered as cured only when all signs and symptoms had disappeared and three successive smears were

negative for gonococci. Seven cases (44 per cent) received two treatments and 2 (12 per cent) received three treatments. Ten patients (67 per cent) were discharged as cured. Three patients (20 per cent) were symptomless and had negative smears at the time of the last examination but did not return for corroborative smears and were therefore classed as improved. Two patients (13 per cent) still had positive smears at the time of the last examination and did not return for further treatment. These cases must necessarily be classed as failures. The average length of time between the first treatment and the last examination was nine weeks for the cured cases, nine weeks for the improved cases, and fifteen weeks for the failures. Table II shows this data.

TABLE II

	NO. OF TREATMENTS			CURED		IMPROVED		FAILED	
	1	2	3	NO.	%	NO.	%	NO.	%
No. of cases	7	7	2	10	67	3	20	2	13
Length of treatment				9 weeks		9 weeks		15 weeks	

Nabothian cysts of the cervix are well treated by the electric cautery. The method consists in using a fine pointed cautery loop (Wappler light cautery electrode No. 2). The loop is heated to a white heat and the cystic area punctured and thoroughly cauterized. Where more than one cyst exists, each cyst is treated separately. There were 13 cases treated in this manner. Of these only 10 are available for study as 3 did not return for follow up examination. Of the 10 who did return, all were cured by one treatment.

It has been customary to treat gonorrheal infections of Skene's ducts by injection of silver nitrate, the cautery being reserved for obstinate cases. However, the results have been so uniformly good in all cases treated by the latter method that it is regarded with more and more favor. Against it is the fact that it necessitates local anesthesia. The pointed cautery tip is placed in the duct and held in place by an assistant. The tissue surrounding the duct is then infiltrated with novocaine. If the infiltration is carried out first, difficulty is sometimes experienced in locating the duct opening. The cautery point is then pushed to the bottom of the duct and the current turned on. The heat should be applied for from four to five seconds. If difficulty is experienced in withdrawing the cautery, this can be overcome by again turning on the current while the tip is quickly withdrawn. Six cases have been treated in this manner. In 4 the discharge and positive slides disappeared after the first treatment. The other 2 cases are still under observation, the treatment having been carried out so recently that no definite information is as yet obtainable.

In treating urethral caruncle the curved cautery tip is used. The

caruncle is anesthetized by either novocaine injection or the application of a cocaine crystal. Minute linear cautery lines are then burned in the caruncle in a manner similar to the eroded cervix. Two cases have been treated with excellent results following one application of the cautery.

In all instances where the cautery is used the patient should be warned that the leucorrhea will be temporarily increased. A daily cleansing douche of sodium bicarbonate has been found soothing and healing and should be prescribed while the treatment is being carried out. That anesthesia is not necessary when the cautery is applied to the cervix is shown by the fact that in no instances was it necessary to stop treatment because of pain. By far the majority complained of no discomfort at all while a few complained of a cramp-like pain in the lower abdomen during and a few seconds following the treatment. It has been found that should this pain occur it can to a great extent be obviated by allowing the cervical tissues to cool before continuing the cauterization.

Objection to this form of treatment has occasionally arisen because of the possibility of hemorrhage. In this series there were 4 patients who stated that the leucorrhea was slightly blood tinged. In 1 case this condition was reported to have lasted for three weeks. In no instance could the bleeding be termed dangerous. Occasionally a temporary mild menorrhagia will appear following cautery treatment of the cervix. In this series notes were made as to the effect on the following menstrual periods in 86 instances. Of these, 81 (94 per cent) had no disturbance. In 3 cases (3.6 per cent) there was a moderate menorrhagia for one period while in 2 cases (2.4 per cent) the increased bleeding occurred for two and three months respectively.

SUMMARY

It is felt that the electric cautery offers a most satisfactory method of treating the milder types of cervical laceration and erosion in the office. In the more severe types, while the results are not so uniform, it is worthy of a trial before resorting to operation, especially if the woman be in the child-bearing period. It is probably the treatment of choice in chronic gonorrheal endocervicitis, gonorrheal infection of Skene's ducts, and the office treatment of urethral caruncle. The procedure is apparently harmless and so far as could be ascertained from this series without troublesome sequelae.

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Society Transactions

AMERICAN GYNECOLOGICAL SOCIETY
FIFTY-THIRD ANNUAL MEETING, WASHINGTON, D. C.

April 30, May 1 and 2, 1928

Symposium on Pelvic Infections

Gonococcal Lesions of the Female Genitalia (title changed), DR. ARTHUR H. CURTIS, Chicago, Ill. (For original article see October issue, p. 531.)

Postpartum Pelvic Infections, DR. BENJAMIN P. WATSON, New York, N. Y. (For original article, see October issue, p. 536.)

The Treatment of Septic Abortion, DR. GEORGE GELLHORN, St. Louis, Mo. (For original article, see October issue, p. 547.)

Tuberculous Salpingitis, DR. CHARLES C. NORRIS, Philadelphia, Pa. (For original article, see October issue, p. 552.)

Cervicitis, DR. FREDERICK C. HOLDEN, New York, N. Y. (For original article, see p. 624.)

DISCUSSION

DR. PAUL TITUS, PITTSBURGH, PA. (By invitation).—Without doubt this matter of pelvic infections is one of the most important subjects confronting the medical profession at the present time. The very diversity of opinion that has been expressed in recent publications seems to show that it is far from being settled.

One or two points suggest themselves as being of practical importance to the patient herself, especially in connection with the treatment of cervicitis by cauterization. We know that the majority of these women who present themselves needing cauterization have leucorrhea as their chief complaint. We know also that leucorrhea can be aggravated most decidedly by the cautery, because the cautery itself causes a profuse discharge. Consequently we must warn the patient that this is to be expected for a time after the treatment else she is likely to be disappointed and to feel that the treatment has been so unsatisfactory that she will not go on with the further treatments so often necessary.

I believe that the patient should be directed not to take douches for at least two weeks after a cervical cauterization in spite of the extra discharge which is so common. There is a distinct risk that douches may force necrotic material up into the uterine cavity or even further. The suggestion naturally arises that those cases of cellulitis referred to by Dr. Curtis may have been in this way the result of douching and that the cauterization itself may be blameless in this connection.

Another thing to be borne in mind is that results cannot be expected too quickly from cauterization of the cervix; that six or eight or even ten weeks must elapse before we can see the final effects of this treatment.

DR. BARTON COOKE HIRST, PHILADELPHIA, PA.—Dr. Curtis sounds a new note of conservatism in the treatment of salpingitis. My conservative treatment used to consist in partial operations but I found I had to reoperate on about 60 per cent of these cases. In Montreal I have seen turpentine injected in pus tubes, and in Dr. Curtis' clinic a little over a year ago, I heard that pus tubes should not be operated on at all, but had the pleasure of watching Dr. Curtis then remove three pairs of pus tubes. Lately I have been evacuating these tubes whenever the pathology in their walls was not too great, and then injecting them with 10 per cent mereurochrome solution by means of a long nozzle, using some little force so as to establish a connection with the uterine cavity proved by the appearance of mereurochrome on the vulvar pad in the next day or two. It is too early to report on the results, but I mention it as one of the conservative methods of treatment of salpingitis.

I was much impressed with Dr. Watson's presentation and am in entire agreement with him except on one point. I think that interstitial streptococcic salpingitis with cornual abscess is a little more frequent than he intimates. It is often difficult to distinguish it from cellulitis with exudate. He was quite right in saying that cellular exudate should be let alone, but in the case of the cornual abscess and interstitial streptococcic salpingitis I have found that the later the patient is operated on the worse the condition becomes; the more involvement of tissue there is, the more radical the operation required.

Dr. Gellhorn surprised me by advocating the sharp curette for the postabortal uterus. For twenty years I have never inserted a curette in the uterus after an abortion or labor at term. Previous to that I was sometimes guilty of the practice. I never allow the word "eurettage" to be used in connection with these cases. The procedure is always listed as an evacuation. I advocate the evacuation of the uterus without traumatism. Out of the long series of intelligent young physicians who have passed through my service as interns, I do not believe there is one who has left it without being convinced that the proper evacuation of an incomplete abortion is the most successful treatment.

Dr. Norris' paper requires no comment, but I might point out the occasional occurrence of tubercular endometritis in the puerperal uterus. I have had some remarkable cases of this sort and without a panhysterectomy I would not expect to save such a patient.

In regard to Dr. Holden's paper I cannot understand the neglect of diathermy in these cases. Most impressed with the results of Dr. Cumberbatch of London, I installed the apparatus for diathermic treatment and have been using it extensively ever since. I had a long experience with linear cauterization of the cervix but have almost entirely given it up. I think any one who tries diathermy in competition with it would come to the same conclusion. Excellent results can be obtained without destruction of tissue and without a trace of pathology afterward. There is no interference with the physiologic action of the cervical glands and the supply of the thick mucus that should plug the cervical canal. Without this plug there is an increase in the incidence of ascending infection, sterility and abortion.

In answer to the President's question about the technic of evacuating the uterus after an incomplete abortion: I dilate the cervical canal with Hegar's bougies, if necessary, then use the Emmet forceps. There need be no traumatism in the anterior of the uterus. Foul smelling masses of stuff are thus removed which cannot be left in the uterus with impunity. The average time of convalescence in the hospital is seven days. A great number of clinical charts could

be shown to support this contention. The temperature, which may be as high as 104°, usually drops to normal within 24 hours. The patient is discharged with no further bleeding and no fever. As a rule, no packing is used. Even when the infection has spread beyond the uterine cavity we do not hesitate to evacuate it if it contains a large amount of putrefying decidua. Surely this would be considered good surgical judgment in any other body cavity or deep wound, in which a mass of sloughing material would certainly delay healing, not to mention the danger of toxemia and of continued and spreading infection.

DR. J. WHITRIDGE WILLIAMS, BALTIMORE, MD.—In connection with Dr. Norris' paper on tuberculosis, I should like to direct the attention of the younger members of the Society to the fact that my thesis for admission to this Society thirty-five years ago was on genital tuberculosis. At that time I pointed out that unrecognized genital tuberculosis was much more common than generally supposed, and I am glad to see that every contribution which has been made since that time has confirmed my original statement.

The whole question of puerperal infection is extraordinarily interesting, and has taken up a good deal of my time; but I might add that had I talked to you ten years ago, I might have talked more convincingly than I can now. I note particularly what Dr. Watson has said concerning the possibility of the extension of the ordinary types of puerperal infection through the tubes to the peritoneal cavity. This, however, is contrary to my experience, as I have witnessed many autopsies upon patients dead from infection and have never seen any evidence of an ascending process through the tubes. I lay great stress upon this point, and each year I show my students microscopic specimens of tubes from cases of fatal puerperal peritonitis which show a perfectly normal mucosa. Occasionally, the peritonitic process may involve the lateral end of the tube, but in such circumstances it never extends far down into the lumen. Of course, in gonorrheal infection, the reverse is true; as in such conditions, the peritoneal infection is an ascending one.

What interests me most in Dr. Watson's paper is what he says concerning the cause of puerperal infection. All studies during the last generation have shown that in the vast majority of fatal cases the infection comes to the patient from without. With our present knowledge we can safely say, barring a few exceptions, that it is due to the aerobic hemolytic streptococcus, for whose introduction we are nearly always responsible. On the other hand, this is not always the case, as we sometimes see women die from aerobic hemolytic streptococcus infection who have had spontaneous labors and have not been examined vaginally. Dr. Watson has increased our knowledge by directing attention to the fact that possibly certain such infections may come from the respiratory tract of those who have come in contact with the patient.

When we, however, consider the forms of infection not due to the hemolytic streptococcus, and inquire whether there is such a thing as autoinfection, we immediately get into difficulties. For years I have taught that for practical purposes, with the exception of gonorrhea, we can practically act as if autoinfection were impossible.

Recently, I reviewed the last 5000 deliveries occurring in my service up to Nov. 1, 1927, paying particular attention to the occurrence of infection. It is our custom whenever the temperature rises to 101° or more on two consecutive days to remove a sample of lochia for bacteriologic study. We have almost an equal number of white and black patients in our material, and I was surprised to find that infection was noted more than twice as frequently in the colored as in the white women, notwithstanding the fact that all had the same prenatal care, and are delivered by the same staff in the same operating suite, and with the

same technic. Furthermore, when we came to consider the bacteriology in these cases, we found that streptococci in general occurred a little more than twice as frequently in the blacks as in the whites, and this held good whether the women had been examined vaginally or not, or had or had not sustained a perineal tear.

During the past 18 months, Dr. Harris has devoted special attention to the study of the streptococci cultivated from 102 women delivered on our service; 28 having been delivered by operative means and 74 spontaneously. He found that streptococci were present in 27 white and 75 black women; in other words, 3 times more frequently in the latter. Upon analyzing the various types of streptococcus he found that 7 of the white and 10 of the black women had showed the beta hemolytic variety; and from what we know of the subject, we are prepared to admit that we probably introduced them into the birth canal. On the other hand, he showed that in the remaining 85 patients we had to deal almost entirely with anaerobic streptococci which could not be grown upon the usual media. In 4 of the whites and 15 of the blacks we had to deal with anaerobic hemolytic streptococci, while in 8 of the whites and 29 of the blacks, we had to deal with aerobic nonhemolytic streptococci, in other words he showed that anaerobic streptococci, whether hemolytic or not, occurred 5 times more commonly in the blacks than in the whites; and for this fact some explanation must be adduced. In the entire series there were two deaths, one due to hemorrhage and shock from placenta previa and occurring two hours after admission; while the other was a neglected eclamptic patient who died from pneumonia 36 hours after admission.

Taking these facts into consideration, it is apparent that we have to face the very remarkable phenomenon, that in our clinic infection occurs twice as frequently in the blacks as in the whites. Furthermore, we find that the serious form, due to the aerobic hemolytic variety, occurs with about equal frequency in the two races; while infection due to the nonhemolytic anaerobic variety appears approximately 5 times more frequently in the blacks.

What does this mean? I do not know exactly. At first glance, one is tempted to assume that the black patients are dirtier than the white and consequently may harbor bacteria in their genitalia to a much greater extent. This would be a very simple and satisfactory solution, but, unfortunately, certain as yet unpublished work by Dr. Harris does not appear to bear out this conclusion, so that I am unable to answer the question; but the fact remains.

The more I see of obstetrics in the two races, the more it is borne in upon me that colored women resist infections of all kinds less well than white women, so that it is within the range of possibility that colored women may be constitutionally inferior to white women, and thus are unable to resist infection to the same extent. This is a point which I think we must bear in mind not only concerning blacks and whites, but also concerning our general population. Everyone is familiar with the relatively high death rate from childbirth in this country, which is higher than in any other civilized country in the world; and it has occurred to me that it may possibly be due to some constitutional inability to resist infection which has developed as a consequence of the admixture of races in this country. Whether this is true or not, I cannot say; but at least it would be a more comforting conclusion than that we do dirtier obstetrics than elsewhere.

Had you asked me a few years ago what I believed concerning the presence of streptococci in the vagina of normal pregnant women, I should have replied that I did not believe in it. Now, I am afraid I shall have to modify my views, and to say that while I still hold the same belief so far as the occurrence of aerobic hemolytic streptococci is concerned, evidence from my own service forces me to believe that it does not necessarily hold good for the nonhemolytic anaerobic variety.

The question of the treatment of infected abortion is a very important one, and the very fact that one set of observers can adduce large series of statistics showing excellent results from conservative treatment, while other equally competent observers obtain equally good results with operative treatment, must mean that the difference between the two methods of treatment is comparatively slight. I take it that the crux of the matter is, that there is not much difference whether we treat the patient conservatively or operatively so long as the infection is limited to the uterus; but when it has extended beyond it, the patient should be left absolutely alone except in the presence of really alarming hemorrhage, and the more conservative the treatment, the better. On the other hand, if this distinction is not borne in mind, the results following radical treatment will be materially worse than those following conservative treatment. We have tried both methods and, barring the reservations just made, the results have been about the same with each.

DR. FREDERICK C. HOLDEN, NEW YORK, N. Y.—At the Bellevue Hospital during the last few years I have gleaned certain knowledge that might be presented here. I will show on the screen several slides illustrating the types of infection with which we have had to deal and the different forms of treatment. From 1920 to 1927 there were 14,000 cases of acute salpingitis, 4072 abortions. We never curette or enter the uterus in abortion. We remove the retained tissues with sponge forceps, pack the vagina tightly and, where necessary, repack for another 24 hours. We feel that the rate of morbidity and mortality is lower in our series than if the uterus had been entered. We cannot conceive of entering the uterus with any instrument and not breaking up the outer layers.

DR. JAMES E. KING, BUFFALO, N. Y.—From Dr. Curtis' paper I think that we have gained the impression that every case should be treated conservatively although he has specified that 15 per cent of his cases were operated upon. We can all admit the possibility of erring in operating upon such cases too commonly, but we are equally justified in saying that we may err also in not operating early enough on certain cases. Any gynecologist who allowed his patient to go on with a pelvic inflammation endangering the ovaries and which will necessitate, as Dr. Curtis himself has said, the sacrifice perhaps of one or both ovaries, I should say, had erred grievously in the direction of so-called conservatism.

In regard to abortions, I feel very much as Dr. Hirst and Dr. Williams do, that these cases may be properly cleaned out where the abortion has occurred after the second month. I do not believe the early abortion of six or seven weeks, that has been brought on by the midwife or shows evidence of infection, should be operated. Later when a placenta may be occluding the canal and preventing good drainage, it seems to me bad practice to leave the placenta there.

In regard to the tuberculous condition of the pelvis, our findings are about the same as Dr. Norris'. About 5 per cent of the cases of salpingitis operated on in the last ten years showed, by the pathologist's report, the existence of tuberculosis. Often at the operating table we are unable to say by the gross examination of the specimen whether it is tuberculous or not. Surgeons should have all extirpated tubes examined by a competent pathologist. Surgery, in these cases, represents only the smaller part of really required treatment of such patients.

DR. LILLIAN K. P. FARRAR, NEW YORK, N. Y.—As to the value of the ice bags in postpartum infections; several years ago at the Women's Hospital I recalled an article dealing with abortions treated by rest continued until patient was afebrile for four or five days. I asked permission to try it. We put all patients entering with an incomplete abortion into bed and kept them there until

they were afebrile. In addition we used an ice bag and found that this made a tremendous difference. After the temperature had dropped and the uterus had contracted it was found to be firm and it was considered perfectly safe to use the sharp curette. We also added pituitrin. Convalescence is very much quicker, the temperature hardly rises more than one degree and the patient is able to leave the hospital at the end of a week. If there is any placental tissue left in the uterus the ice bag helps to prevent infection.

DR. O. H. SCHWARZ, ST. LOUIS, MO.—In 1924 we began to grow our uterine and blood cultures, both under anaerobic and aerobic conditions. In this work we followed very closely the technic of Schottmueller published in 1910. In a very short time we were able to confirm all of Schottmueller's experiences, and published an article concerning these facts in the *American Journal of Obstetrics* in April, 1927. Schottmueller, who is an internist, has a large septic ward in Hamburg, and Heynemann, the gynecologist in the same clinic, has a similar service. They see many anaerobic infections and are inclined rather to the radical treatment of infected abortion than to the conservative. In postpartum infections, however, Heynemann is very conservative. It is also our experience that anaerobic streptococci play an important rôle in puerperal infections.

As regards treatment in infected abortions, it was clearly stated by Williams that if the infection had spread beyond the uterus the case should be left alone as far as possible. In the absence of such obvious spread and in the presence of a discharge or with the products of conception retained, evacuation of the uterine cavity should be performed. Whether the evacuation is done in one way or another does not seem to be so important, so long as no sharp instruments are used and no rough manipulation is carried out. It is best done with the finger, a dull instrument, or an ovum forceps. We often employ an ordinary sponge forceps. We prefer also give a uterine douche of 1-4000 potassium permanganate under low pressure after this procedure.

The general practitioner should be impressed with the necessity that cases of infected abortion should be immediately hospitalized and an obstetric consultation obtained.

DR. WM. R. NICHOLSON, PHILADELPHIA, PA.—It seems to me of the utmost importance that one particular point should be stressed, namely, the necessity of a thorough external cleansing of vulva and perineal region before any vaginal examination is made during any stage of labor or abortion. I agree with Dr. Williams that the majority of infections are introduced from without.

I myself cleanse the introitus of the vagina and perineal region of every patient whom I am about to examine. Based upon my experience this thorough external cleansing is the most important single prevention of puerperal sepsis at the present day since the various items of the armamentarium are now carefully prepared and are surgically clean.

DR. JOHN A. MCGLINN, PHILADELPHIA, PA.—The discussion today has brought very strongly to my mind the danger of dogmatism. I think that the mortality of appendicitis today is higher than it was ten years ago because the cases are not coming in so early as formerly. Many persons have misinterpreted Ochsner's statement not to operate on these cases early. I do not believe that Ochsner meant that they should not be operated upon in seventy-two or ninety-six hours, but only in a certain type of case should operation be delayed. But because of these dogmatic statements, the general practitioner is not sending his cases in early. The same thing holds true in relation to the statement that the curette should never be used in an abortion. That statement has been misinterpreted to read

that an abortion should never be interfered with. Dr. Holden showed that he interfered with 150 cases and yet it was stated that in Philadelphia they never interfered. He meant that he did not interfere with septic abortions. I do not believe that anyone would hesitate to interfere in an incomplete abortion. Unless the case is brought in promptly and operated upon, infection is being invited. The general practitioner is getting the idea that abortions should not be interfered with and, therefore, the surgeon does not get them until they are badly infected. In cases of incomplete abortion I empty the uterus, in the absence of temperature, because I believe that a contracted uterus is in no danger of infection. If the infection is limited within the uterus and there is a mass protruding from the cervix I lift it out in a way that will clear the uterus, certainly not with a sharp curette, but with a forceps, followed by packing. I believe that the safeguard in any case of abortion is a contracted uterus and unless the uterus is contracted down the infection is apt to spread.

DR. EDMUND B. PIPER, PHILADELPHIA, PA.—I understand that before I arrived Dr. Gellhorn said that mercurochrome intravenously was of no use. Dr. Watson said practically the same thing. I agree with Dr. McGlinn that when people use the word *never* they get themselves into trouble. For instance, Dr. Holden said he never curetted a case and then showed 150 cases that he had curetted.

I agree in a measure with Dr. Gellhorn in regard to mercurochrome. I brought mercurochrome out originally because I hoped it would cure puerperal sepsis, but it does not, and I said three years ago that it does not cure. But when one says that it does not do any good in any kind of a case, it shows that he does not know how to use it. You cannot take a blood stream infection, where you have a local infection continuously pouring out microorganisms, and expect to sterilize the blood stream.

In 1925, I stated before this Society, that I dreamed a dream and it became a nightmare. As far as blood stream infection goes in other parts of the body, particularly in children following mastoid operations, we get some very good results. I recently read in a textbook that the way to give mercurochrome was 25 c.c. given every day for a number of days. I wrote and told the writer that those patients given mercurochrome in that way would have acute nephritis, stomatitis, enteritis, and would probably die.

Dr. Watson and I agree, I am sure, in all his statements except that I would not quite agree that mercurochrome is of no use whatever. Whether there is an infection is dependent upon three factors: dirty obstetrics in the first place; second, the resistance of that particular individual; and third, autoinfection.

DR. WILLIAM A. SCOTT, TORONTO, CANADA.—I am convinced that if the principles laid down by Dr. McGlinn were carried out in general practice a very dangerous procedure would cease: the practice of unnecessarily packing abortive cases. The idea has reached the general practitioner that septic abortions are to be treated for the most part in a conservative manner but, as Dr. McGlinn pointed out, often the physician does not distinguish between the aseptic and the early nonaseptic abortion. One of the most common symptoms is bleeding, but packing for it is often used unnecessarily and with very great danger of converting a nonseptic condition into a septic one.

Dr. Watson pointed out that many cases harboring hemolytic streptococci in the cervix previous to delivery pass through an uneventful puerperium, that some of the patients develop severe infections from their own endogenous bacteria,

but the aliens introduced with manipulations prove more dangerous to them. But what is an autoinfection for one patient might become an alien infection for another and for this reason we are, as far as possible, taking cultures from all our antepartum cases. Thus we discover those which represent a potential danger to other patients and keep them isolated.

DR. WILLIAM P. GRAVES, BOSTON, MASS.—Our observations have led us to the conviction that strictures of the genital tract constitute an important etiologic factor in the production of cancer. This conclusion relates not alone to the stenoses of the internal os and external os of the cervix but also to those of the upper and middle vaginal canal, and even to those of the vaginal introitus. We find the condition especially frequent in association with cancer of the uterine body; and with sufficient frequency in cancer of the cervix to regard it as a probable causative factor. We have repeatedly been able to show that obstructed genital drainage is an important element of irritation in the production of leucoplakia and kraurosis of the vulva, both of which conditions must be regarded as potentially precancerous states.

If these conclusions are true, they are of far-reaching import both to the general practitioner and to the gynecologic specialist. Not only must strictures be recognized at and after the climacteric, but in the general treatment of gynecologic patients throughout life. The possibilities of later contractures must be continually visualized and preventive measures taken. Every time that a plastic operation is performed, or the cautery used, or radium applied, one must calculate, and allow for, the atrophic changes that the menopause will produce in the tissues.

The subject is of much importance in the general care of women who have passed the menopause. All women, especially those who have not had children, should receive an expert examination at the climacteric and at stated intervals thereafter. If stenoses are encountered they should be rectified by proper operative measures that establish competent drainage throughout the genital tract.

In regard to cases of chronic pelvic inflammation, we believe in releasing ovaries from adhesions, on the general principle that immobilized pelvic organs cause discomfort.

Freeing an adherent ovary often causes severe lacerations. But these lacerated organs can be adequately repaired by skillful plastic maneuvers, so that they may retain their full function with little or no reformation of the adhesions.

The other question raised by Dr. Curtis is that of leaving small bits of ovarian tissue either in situ or in distant parts in order to retain a semblance of menstruation. Like Dr. Curtis we have seen a number of patients who after such treatment suffered from interminable menstrual molimina. We, therefore, endeavor to leave ovarian tissue sufficient in amount to maintain full menstrual function, and if this cannot be done we favor the clean sweep.

DR. BROOKE M. ANSPACH, PHILADELPHIA, PA.—In our service we do not operate on pelvic inflammatory cases unless we are unable to relieve the symptoms in any other way or we wish to open the tubes to favor conception. If we operate for the relief of symptoms we remove the focus of disease, which is usually the tubes, and conserve the uterus and ovaries as best we may. Operation for opening the tubes is not often successful and we never do it only for the purpose of favoring conception without the patient's full knowledge of the small chance she has that the operation will achieve its purpose.

As to the question of the prevention of puerperal sepsis, I am in hearty accord with what Dr. Nicholson said about the thorough preparation of the patient for examination. In the treatment of this condition I am more than ever convinced

that operation should never be undertaken unless there is a localized collection of pus and then it should be opened in the simplest way.

I still believe that mercurochrome and the other intravenous antiseptics have a place in our therapy. I have seen good results from their use, especially as adjuvants to other plans of treatment. If the incomplete abortion case is clean, the uterus should be emptied, but in the case of septic abortion how are we able to tell whether the infection is in the uterus or has gone beyond the uterus? Our practice is to treat the condition conservatively until the temperature comes down, unless there is much bleeding, and then we control it and promote dilatation of the cervix by the insertion of a pack. The products of conception are afterwards removed with the finger and placental forceps.

The woman who has symptoms following labor from a retroflexion should be treated, if possible, with a pessary and not operated on until her reproductive period is at an end. Profuse leucorrhea occasioned by an everted cervix is not controlled by the correction of the uterine position. It can be cured only by trachelorrhaphy or by cauterization. The cautery allows us to make these women comfortable for the time being with the pessary, doing the repairs and correcting the displacement later by an operation.

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—In leaving healed tubes, does Dr. Curtis attempt to differentiate between gonorrheal and postabortive tubes? I am afraid to leave the tube with a history of postpartum or postabortal infection. We rarely operate during the first attack of a salpingitis but we find many cases returning who on account of their economic conditions cannot afford to spend repeatedly much time in a hospital. If there are palpable masses which are giving them symptoms and causing recurring disability, we then operate.

We see relatively few cases of tuberculosis of the genital tract in our clinic. This might be due to the fact that all our tuberculous patients find careful and extensive hospitalization in our state and county tuberculous hospitals.

In regard to Dr. Watson's paper I wish to mention that a number of times it has happened in our municipal hospital that coexistent with epidemic infections of the upper respiratory tract we have had definite outbreaks of infection in the obstetric wards, affecting not only the mothers but also the babies. We have made nose and throat cultures of all the personnel on the floor, of every one having to do with the technic of the floor. We had a very striking illustration of the multiplicity of carriers in an outbreak which we had this winter. All the personnel of the floor showed throat and nose cultures positive for streptococcus and staphylococcus, some harboring both organisms. However, there was one exception. A nurse who had been out of the city on a vacation until 24 hours before had a negative culture. The procedure we have found most effectual is to require the whole personnel to wear masks covering both the mouth and nose in addition to other usual precaution as gowns, washing hands between handling patients, etc.

Another point that I think is very important in this connection is the overcrowding of an obstetric floor. Overcrowding leads to overwork of the personnel, laxity in technic, etc. We have now learned to stress this in the prevention of these conditions and try to avoid overtaxing our normal capacity.

I will simply state what we do in managing infected abortions. We usually expose the cervix with a speculum, and any tissue or blood clots or products of conception which lie in the canal are removed without entering the uterine cavity if this be possible. This usually controls hemorrhage and also provides freer drainage from the uterus. If we cannot control the hemorrhage in this manner

we insert a pack, but this is seldom necessary. We try not to invade the uterine cavity in any febrile case or any case which is potentially infected, by which we mean a case which has been manipulated before entrance into the hospital. It is relatively safe to enter a uterus once but to enter a second time is extremely dangerous and most of the fatal cases of sepsis which I have seen following abortion have been cases where the uterus has been entered more than once. In practically all the cases we ultimately empty the uterus before the patient leaves the hospital but usually not until they have had from three to five days of normal temperature.

We should remember in teaching the students that many of them will be general practitioners and will have to work in the homes of rural communities and we should not teach them a technic they cannot safely apply in such an environment.

DR. JOSEPH L. BAER, CHICAGO, ILL.—In the Michael Reese Hospital of Chicago we insist on the complete masking, and that applies to all including those who come in contact with the armamentarium. We believe also that the house staff should have the opportunity to do an initial vaginal examination which establishes a more accurate status presens. For this examination the patient and the examiner are prepared as for delivery.

After Dr. Danforth had proved the harmlessness of pituitrin given immediately after the end of the second stage we adopted that as a routine. The placenta separates very quickly. This avoids manipulation of the uterus which sometimes causes severe trauma and thrusts the cervix into the introitus exposing it to infection.

The treatment of puerperal sepsis in our service consists essentially in rest, a high Fowler position, abdominal ice bag, an abundance of nourishment, and neither specific vaccine therapy nor chemotherapy. However, believing in the correctness of the newer physiology of the body defenses, we do occasionally use a foreign protein shock or when the patient's condition is grave, repeated small blood transfusions.

For the septic abortions we believe that the uterus should be emptied, granted that there is no broad ligament or adnexal involvement. If we feel that the uterus is the sole point of infection we have no objection to removing the infected débris, preferably using the Hegar dilators to admit the finger and then with the finger separating such particles as are attached and removing the contents with the ovum forceps. If the cervix is closed we pack the vagina until the cervix is sufficiently softened, usually 12-18 hours. The sedimentation test more delicately than the leucocyte count establishes the absence or presence of infection, shows the severity of the infection and its progression or retrogression. We use the cautery freely as a treatment for cervical erosions.

DR. CURTIS (c'osing).—Dr. Titus inquired whether douches were used in those patients who develop cellulitis following cauterization. One of my hobbies has been the avoidance of douches and all of our patients are urged not to employ them. Dr. Graves' discussion pleases me very much. I hope he appreciates not only the importance but also the frequency of cervical obstruction.

It is not always possible to differentiate in old healed tubes as to whether they are of gonorrheal or of streptococcic origin. If there is a question relative to removal or a doubtful ovary, we believe that more radical surgery is indicated in streptococcic infection than in gonorrheal disease of equal severity.

DR. WATSON (closing).—I think that every one has agreed that in the vast majority of cases the organisms that cause puerperal infection are introduced

from without and I would like, therefore, to emphasize the importance of the preparation of the patient and especially the thorough masking of nose and mouth not only at time of delivery, but from the time that the first examination of any kind is made and up to the first two or three days of the puerperium.

The observation of Dr. Williams in regard to the incidence of those infections in the colored as against the white race brings out what I said as to the susceptibility of the individual, and that an organism which is alien is more likely to cause serious infection than one to which the patient may have become immune.

The important point of the discussion has been about the question of conservative as against radical treatment both in postpartum and postabortal infection. The divergence of opinion may have seemed to be great, but after all it is very little as between those who have advocated an absolutely conservative treatment and those who have advocated a more radical treatment. We must remember that those who have advocated radical procedures are skilled men who carry out these procedures with the greatest gentleness. I believe that this Society sent forth the message that the indiscriminate emptying of an infected uterus was advocated it would be a bad thing for the population at large because unquestionably these things would be done by men who have not the proper equipment or skill to carry it out with the gentleness which is necessary if ill effects are to be prevented. When an infected uterus has to be emptied I agree with Dr. Gellhorn that it is safer to do it with a large, sharp loop curette than with a blunt curette or the fingers, using the sharp curette as a snare to remove the fragments. This will not damage the uterine wall but will accomplish what is necessary.

Dr. Piper rather thought that I had decried the mercurochrome treatment of puerperal sepsis. I did not mention it at all in my paper. I look upon it, as upon the other methods of intravenous therapy including blood transfusion, as a nonspecific therapy which may in a large number of cases do good simply by raising the patient's resistance.

DR. GELLHORN (closing).—The discussion as far as it pertains to the treatment of septic abortion, has been dominated by a strong tendency toward conservatism with which I personally am wholly in accord. But while we who control hospital wards, may well observe a "masterful inactivity," the individual obstetrician or general practitioner is, as a rule, subject to pressure from without which is impatient of any sort of watchful waiting. It is for this reason that I suggest a compromise. If after three days of observation the parametria and perimetrie tissues are found involved or if only a tenderness is detected upon examination, this indicates a progressive infection in which the uterus under no circumstances should be cleaned out. If, however, after three days no such involvement has occurred, we may assume that we have to deal with a less harmful infection, perhaps only a sapremia, and proceed to the evacuation of the uterus even in the presence of fever. This criterion seems much safer to me than bacteriologic laboratory examinations with their conflicting findings. My proposal, therefore, is a perfectly legitimate pragmatism, not a betrayal of principles for the sake of convenience.

In case we have to empty the uterus, I still believe, that the very large, sharp loop curette is safer than the dull curette and the placental forceps, provided it is used with gentleness and caution. If we have failed to impress the necessity of such caution upon our students, we have, I fear, been remiss in our fundamental duties as teachers.

The prevailing mereurochrome fashion will in time go the way all other bactericidal injections have gone. In this method only the brilliant red color is new, the principle is old.

DR. JOSEPH BRETTAUER, NEW YORK, N. Y.—It appears to me that the views expressed in this discussion are not so divergent as they seem and that we have derived considerable knowledge from them. For instance, in the methods employed it is not so much a question of what to use as how to use it. In the hands of experts the result is the same and no harm is done, whether the method used be the forceps, the blunt curette or the sharp curette. The majority of the speakers are ultraconservative, which is a quite different attitude from the one prevailing at our meeting here five or six years ago, and entirely changed from the extremely radical one of some fifteen years ago.

Premarital Examination and Instruction as Routine Preventive Gynecology, DR. ROBERT L. DICKINSON, New York, N. Y. (For original article, see p. 631.)

DISCUSSION

DR. EDWARD A. SCHUMANN, PHILADELPHIA, PA.—In the light of present day medical thought, one must necessarily agree with most of Dr. Dickinson's propositions. In so far as premarital examination goes I am thoroughly in accord. As to the best procedure to be adopted, should such examination disclose disease in one or the other of the contracting parties, I am not so sure. Venereal disease and other illnesses readily amenable to treatment offer no great problem, since the deferring of marriage until cure is complete, is a fairly simple matter. But when one considers the question of the chronic constitutional lesions as tuberculosis, for example, the problem becomes involved.

There are three ways of dealing with this solution. First, we may rigidly exclude persons suffering from transmissible disease from marriage and procreation. Second, we may allow marriage and procreation in the hope that through the constant introduction of resistant blood into any family strain the virulence of the disease may be attenuated until all of its force is gradually spent. Third, we may agree that civilization has progressed so far that physical excellence is no longer a matter of special importance and that the citizen of today is possibly far more valuable to the State by reason of mental attainments than by physical perfection. The old aphorism "*Mens sana in corpore sano*" may be much overdone. I confess that I should have suffered a keen personal loss had Robert Louis Stevenson's tuberculous mother been prevented from marrying and giving her illustrious son to posterity.

Now as to the spacing of children. Here, again, I wonder! Men have been breeding animals selectively and eugenically for many, many years and except for the exaggeration of special characteristics, their efforts have resulted in degeneration rather than improvement. Virility, strength, longevity, all have suffered under man's breeding principles as opposed to those of Nature.

I feel convinced that the natural time for reproduction as chosen by Nature's laws will produce better offspring with greater possibility of carrying the torch of human race betterment, than synthetic families, conceived and born at such times as best suits the economic exigencies of their parents.

Pyelitis and Pregnancy, DR. JAMES W. DUNCAN, Montreal, Canada.
(By invitation.) (For original article, see October issue, p. 557.)

DISCUSSION

DR. WILLIAM C. DANFORTH, EVANSTON, ILL.—Our knowledge of this subject has been growing steadily during the last two or three years. The importance of ureteral obstruction as an etiologic factor in pyelitis of pregnancy is receiving an increasingly greater amount of attention. Last year I presented a series of thirteen cases of pyelitis of pregnancy in all of whom after delivery obstruction of urinary drainage still existed. Schreiber of New York, reporting on a series of 100 autopsies studied in Europe, was able to show that 12 per cent had a hydro-uretero-nephrosis of some degree which was dependent in every instance upon a narrowing of the ureter either at its pyeloureteral junction or at the vesical portion.

Dr. Duncan has already referred to the communication of Dr. Hofbauer in which he brings out the muscular hypertrophy which occurs in the trigone with the result that the vesical end of the ureter is narrowed. The important fact is that a definite obstruction of urinary drainage exists and that this during pregnancy is apt to be much exaggerated. Treatment of this condition must be based upon this fact. The essential thing is to establish urinary drainage. The possibility of focal infection elsewhere in the body, which with a urinary stasis due to obstruction may cause a hematogenous infection of the kidney and its pelvis, should not be overlooked. Eradication of focal infections is of importance. We should not look upon pyelitis of pregnancy as a transitory condition which requires little attention. These cases do require active treatment not only during pregnancy but some time thereafter.

DR. NORRIS W. VAUX, PHILADELPHIA, PA.—Dr. Curtis, in his work done some years ago came to the conclusion that there was some definite obstruction in the lower urinary tract during the course of pregnancy. This blocking has been beautifully shown by the slides of the hydronephrosis which Dr. Duncan has so well demonstrated.

In 1923, studying a series of some fifty cases which I reported before this Society, we were able to determine definite edema or swelling in the trigone of the bladder. We did not have pyeloureterograms made of all cases at that time, and we were uncertain that the dilatation of the ureter was a definite factor, as well as the trigone swelling and edema. Associated with this there was a turning up of the lower ureteral orifice and in some cases a very definite residual urine was present.

In a fairly extensive maternity service, both outpatient and hospital, we have found pyelitis occurring in pregnancy to be much more common than we had previously thought existed. When a case appears at our clinic that shows a great deal of sediment, particularly pus in the urine, we have that case report for further cystoscopy and ureteral study. We have found that by taking such cases before they develop true pyelitis symptoms, and also those cases that have only a small amount of pus in the urine, and by treating them prophylactically we believe that we are able to cut down a definite percentage of cases that would develop pyelitis later in their pregnancy.

We have found a dilatation of the ureter in pyelograms such as Dr. Duncan has shown in his slides in a few cases, but have not known how to account for it other than that it may have been a permanent condition present.

DR. GEORGE GELLHORN, St. Louis, Mo.—Dr. Duncan's beautiful demonstration supplies anatomic proof of ureteral obstruction which, he says, leads in turn to urinary stasis and this again to infection. But since this obstruction is physiologic in pregnancy, if I understood him correctly, the occurrence of pyelitis should be expected in practically every pregnant woman; at any rate, it should occur more frequently than it actually does.

Is it not possible to consider dilatation (not obstruction) of the ureter as the primary thing and explain it as being caused by a lowered tonus of this structure due to pregnancy changes in the vegetative nervous system? Such an explanation would render more plausible the very marked dilatation of ureters which has been disclosed by x-ray pictures in the earliest weeks of pregnancy.

I do not believe that an ascending infection of the bladder is a frequent cause of pyelitis because there is usually no history of bladder symptoms prior to the attack. Focal infections may undoubtedly be responsible for some cases of infection of the kidney pelvis, but this etiology is probably rather rare.

It is much more likely that the chronic constipation in women which is so often aggravated in pregnancy, plays the decisive rôle. The intestines, like the ureter, have a lowered tonus in pregnancy, and this physiologic dilatation, which in extreme cases may even lead to ileus, gives the colon bacillus a chance either to wander through the intestinal wall into the ureter or, more likely, to enter the circulation whence they would have to be excreted through the kidneys. I have for some time paid particular attention to this point and noticed that pregnant as well as nonpregnant patients with pyelitis give a history of constipation prior to their attacks.

The practical application is self-evident. Stoeckel and others have demonstrated the beneficial effect of thorough mechanical cleansing of the intestinal canal; and with me, copious colonic flushings form an integral part of the treatment of pyelitis.

Another reason why the obstruction theory of pyelitis does not fully satisfy me, is the observation that a simple ureteral catheterism often suffices to relieve the syndrome for the rest of the pregnancy. Yet, as the obstruction remains or forms again soon after the catheter is withdrawn, one would logically expect a return of the symptoms.

In closing, may I be permitted to point to the danger of puerperal sepsis from a neglected pyelitis. It is quite conceivable that in such a case urine contaminated with colon bacilli or other bacteria, may run into the vulva during labor and give rise to childbed fever. This possibility alone demands most energetic treatment of the pyelitis during pregnancy, and long-continued observation after the confinement so as to forestall a recurrence in the next pregnancy.

DR. DUNCAN (closing).—In regard to Dr. Danforth's remarks I might say, we have endeavored to work out the question of focal infections. We have attempted in a series of rabbits to create focal infections in various parts of the body as close to the kidney, as in the hepatic flexure of the colon, and have not been able to recover, uniformly, in the tied side or the untied side of the ureters, direct cultures of coli. The possibility that a focal infection in the tonsils or sinuses or teeth might lower the woman's powers of resistance, plus an obstruction, might very well explain that woman falling an easy prey to pyelitis.

In regard to drainage, I would simply point to our postpartum cases in answer to Dr. Danforth's query; no doubt, with drainage established in these postpartum cases the danger of developing an infected condition will be much lessened.

In answer to Dr. Vaux's question as to constipation, we have fully realized the extreme danger of constipation. After tying the transverse colon of rabbits with a loose ligature, bringing about an incomplete stasis, we have actually been able to recover from the ureter the bacillus coli in the tied side, also a positive culture in the urine on the tied side under the most rigid technic. In the untied side we have not been successful in recovering coli from the bladder in large quantities, whereas in the undisturbed, undamaged glomerulus we have found the Bacillus coli, so that we have concluded from this series of experiments that if we go on further it may be possible to demonstrate that constipation plays a very large factor in the development of pyelitis.

In reply to Dr. Gellhorn, I would point out that congestion has a tremendous effect upon the ureter and upon the parametrium, which is one of our main claims for the production of obstruction and that occurs as early as the sixth week, in no way preceding the slight dilatation such as we have shown.

The distortion of the trigone which begins in multiparae at the sixth week and in primiparae at the tenth week, associating itself with a mild degree of dilatation, is physiologic and does not become pathologic until the twenty-fourth week, when stasis makes its appearance. I am in sympathy with Dr. Gellhorn's remarks about the parasympathetic nervous system. There is no doubt that it plays a part in the ease with which the ureter gives way. I quite agree that the patient should be treated clinically along the lines which he suggested. I would point to the fact that this stasis has a very grave effect but it begins to disappear about the ninth day postpartum.

A Comparative Study of Certain Gynecologic and Obstetric Conditions as Exhibited in the Colored and White Races, DR. C. JEFF MILLER, New Orleans, La. (For original article, see p. 662.)

DISCUSSION

DR. WILLIAM T. PRIDE, MEMPHIS, TENN.—One feature of Dr. Miller's paper is especially interesting to me and that is the abnormal deliveries. Some years ago I left Philadelphia and entered practice in Memphis and was very much surprised at the measurements that we obtained in pelvimetry. In Philadelphia we had not assumed any difference between the colored and the white, but in the South we always found the difference. I tabulated over a period of years about 1500 cases, part of them taken from the South and part from the North, and we found that the difference existed not only in the negro, but in the Northern and Southern negro.

Dr. Williams reported about 4000 cases some years ago but naturally he took all of his data from Baltimore. Mine taken from the North and from the South demonstrated that the Northern negro is larger in pelvic measurements than the Southern; that the Northern white woman is larger than the Southern.

Our deliveries are not operative as often in the colored as in the white. I have always attributed that to the fact that they are stronger, they stand pain better, and our statistics prove that they will labor very much longer without any assistance than the white woman will.

There are many other features of this subject that are interesting, for instance eclampsia. We see eclampsia more frequently in the colored race according to our statistics. I think that is due to neglect. Since we have been running

an outpatient department and have about 500 cases under observation, the incidence is much less but even now the colored have eclampsia more frequently than the white.

Birth injuries, as Dr. Miller has shown, are very much less in the colored race than in the white, and we are surprised at postpartum examination to find the patient in perfectly good condition in the colored race and often we find the reverse true in the white woman.

DR. DE WITT B. CASLER, BALTIMORE, MD.—Dr. Miller's paper has brought up a number of problems in which we, in Baltimore, have been interested for a long time. We have realized, as he has, that the negro presents a very different problem from the white. As Dr. Miller has brought out, the colored come in with larger tumors, with greater complications, and they can stand more extensive operations in a much better way than the white patients.

Dr. Miller's statistics correspond in some ways very closely to ours; in other ways, they differ very much. As far as pelvic inflammations are concerned, we have always realized that they are more frequent in the black race, especially gonorrhea and lues. Tuberculosis of the pelvis is about one and a half times as frequent in the colored as in the white. The difference is even more striking in regard to tuberculous peritonitis, which is just about two and one-half times as frequent in the colored, as in the white. As to the granuloma inguinale, we rarely see it in the white race.

One of the rarest operations that we see in Baltimore is postpartum repair of a vaginal tear in a colored woman. We seldom do an operation for suspension following childbirth uncomplicated with pelvic inflammatory disease. Colored people are emotional but they are not neurotic patients.

Some few years ago, I went over all the cases of suspension of the kidney that had been done from the early days of the hospital, and out of many hundreds of cases, there was only one suspension done on a colored woman. That case was operated on six months later for tuberculosis of the kidney, and the diagnosis had been wrongly made in the first place.

We differ with Dr. Miller in regard to carcinoma. In the last 2000 cases we found the numbers of black and white patients about equal. In fifteen cases of adenocarcinoma of the fundus, there was only one colored woman. Almost exactly the same percentage holds true in the endometrial tumors of the ovary. In the last 2000 cases, we had 17 chocolate cysts of the ovary, and only two of them in the colored race. Carcinoma of the cervix is relatively on the increase with the colored patients, and at the present time we are seeing about as many in the colored as in the white. Fibroids are much more common in the colored race. Why this is, we do not know. One would naturally expect, as fibroids are so common in the colored women, that enlarged prostates would be common in the men, but on the contrary, the genitourinary surgeons tell us this to be extremely rare. Why that is so, is a difficult question to answer.

DR. EDWARD A. SCHUMANN, PHILADELPHIA, PA.—I bespeak the attention of the Society to a problem in this connection that I have been studying for a number of years. It appears that the intermarriage of a mulatto for two or more generations produces a fairly stable race and anthropologists have begun to become interested in the occurrence of this so-called American phenomenon in a group of people breeding true and with a high mental index. I have carefully observed these people over a long period of years and they seem to have inherited, contrary to the usual rules of hybrid races, diseases incident to both the black and white. Resistance to gonorrhea, syphilis and tuberculosis is very high and

this particular race of people seem to withstand surgical traumatism and shock with as great efficiency as either the colored or the white race from which they sprung. I would call attention to this phenomenon and ask that the members seek to observe and corroborate my statements if possible.

DR. ALFRED PLAUT, NEW YORK, N. Y.—We have been told that carcinoma of the cervix has about the same occurrence in white and in colored women. It has been shown also that carcinoma of the body of the uterus is much rarer in colored women than in white women. This statement is very interesting in relation to the widespread opinion that myoma uteri is a predisposing factor to carcinoma of the fundus. For, as we all know, myoma uteri is very frequent in colored women. I never saw a real proof of the statement that myoma predisposes to carcinoma; I cannot consider Nobel's paper as convincing. The occurrence of myoma is so frequent that only a strict mathematical analysis can give any reliable statistical data concerning this connection with another disease. The fact that colored women with their high incidence of myoma seldom have carcinoma of the body appears as a sort of proof to the contrary of the assumption that myoma predisposes to carcinoma.

It would be well if we could have a similar check-up on the relation between carcinoma of cervix and laceration of cervix during childbirth. The belief that laceration is a chief causative factor in cancer of cervix seems so widespread and firmly rooted that it needs courage to say that one does not believe in it. Here, again, both lesions are very frequent; there are few women at the cancer age who have not had cervical laceration from childbirth, and thus a real relationship between both diseases is extremely difficult to prove statistically. Certainly the laceration should be repaired, but cancerphobia is a bad disease also.

DR. JOHN A. MCGLINN, PHILADELPHIA, PA.—The colored race presents some problems in the North but not to the extent that it does in the South, which bears out what Dr. Miller has said. Out of all the cases of granuloma which we have had at the Philadelphia Hospital only one was in a white woman, all the rest being colored. In fact, I have seen only two cases of granuloma in white women. My experience is the same as Dr. Miller's, that when a colored woman comes in for pelvic inflammatory disease the lesions are so extensive that they usually require total extirpation of the pelvic organs.

DR. MILLER (closing).—A study of the negro race, especially in connection with the changes in their environment, is a task which will require the aid of the ethnologist. It cannot be done purely by the medical men. It is almost impossible at the present time to classify the negroes in our hospital services in any but the most general way; that is, it is no longer possible to identify them as to their original tribal affiliations. The Congo type is undoubtedly the best of the original races.

I differ with Dr. Schumann as to the stability of the mixed type. We find that they have not the resistance of the pure black type, and as a matter of fact, for the most part they succumb very readily to disease and they withstand surgery badly. The most remarkable thing, to my mind, about the negro in his civilized environment is the way he has lost his immunity to the so-called diseases of civilization, particularly intestinal disease. He has always had a weakness for pulmonary disease, and the same situation is now developing, as my figures show, in regard to intestinal disease.

Immediate and Remote Results in Two Hundred Twelve Cases of Prolapse of the Uterus, Drs. JOSEPH L. BAER and RALPH A. REIS, Chicago, Ill. (For original article, see p. 646.)

DISCUSSION

DR. HILLIARD E. MILLER, NEW ORLEANS, LA. (By invitation).—As this paper very clearly proves, successful results can be expected in the management of uterine prolapse only if each individual case is considered on its own merits. All successful operations, however, have certain underlying premises in common. In the first place, the vaginal canal, like the inguinal, is normally oblique, and, like it, is protected chiefly by the action of intraabdominal pressure. In the second place, once the obliquity of this canal is destroyed by injury to its supporting fascia and once the ligamentous supports of the uterus are weakened, descensus of one or all of the pelvic organs is the inevitable result, the degree depending upon the extent and the location of the injury. In the third place, prolapse of the uterus is essentially a hernia which may involve not only that organ but also the adnexa, the bladder, the rectum and the vagina. Any operation, therefore, for the correction of uterine prolapse must restore the supporting fascia and the ligamentous attachments of the uterus, and thus restore the obliquity of the vaginal canal, before it can be expected to correct the herniation of the pelvic organs.

In our experience the Watkins interposition operation has secured these results in all properly selected cases. This operation must never be done in the child-bearing period unless special indications exist and the patient agrees to sterilization. I noticed that Dr. Baer's percentage of sterilizing operations is higher than in our service. The interposition operation is not adapted to cases in which the uterus is so hypertrophied that high amputation of the cervix or partial resection of the fundus will not reduce it to approximately the normal size, nor is it adapted to cases in which the uterus is too small to serve as a proper support for the bladder.

If the cases are properly selected, failures are very few, as we proved by a follow-up of our patients a few years ago. We averaged more than 90 per cent of cures with this procedure.

I was surprised to see the small percentage of cases of incontinence reported by Dr. Baer, and I presume it is due to the fact that women, for some reason, simply do not complain of this symptom.

A most important point is the treatment of these cases prior to operation. A rest in bed to reduce the edema of the parts and restore as far as possible their normal relations, plus the treatment of possible bladder pathology will go far to make the convalescence smooth and the operation a success.

DR. HARVEY B. MATTHEWS, BROOKLYN, N. Y.—The type of patient, the familiarity with the operation that is chosen and the dexterity with which the individual operator can perform that operation are the most important facts in regard to results. The success of the operation depends a great deal upon how efficiently the parts are prepared before operation is begun.

In regard to sterilization, we are in the habit, rather than ligating or dissecting out the tubes, to insert a capsule of radium, 25 to 50 milligrams in those cases in which the poor condition of the patient does not warrant additional ligation of the tubes.

The grading of the degrees of prolapse is an important point. Dr. Baer's division corresponds with what we use for teaching purposes at the Long Island College Hospital. If the worker in this field would standardize the division according to his scheme it would clarify a very confused subject.

Dr. Baer had 54 cases or 24.5 per cent of pathologic conditions in the cervix. This seems like a very low incidence.

There were 96 cases of prolapsus uteri operated upon in our clinic during the past six years. Dr. Baer employed nine different types of operation for prolapse while we have used seven different types, as follows: Watkins interposition, 36 cases; Vaginal fixation, 18; Vaginal hysterectomy, 5; Panhysterectomy, 3; Murphy fixation, 6; Baldwin-Emmett operation, 8; and Vaginal plastics with suspension of the uterus, 20 cases.

We have more recently left a retention catheter in the bladder in all vaginal plastic operations. I got this idea from Dr. George Gray Ward at the Woman's Hospital of New York, who uses the mushroom retention catheter in all his radium cases. It occurred to me that it might be good for any bladder that had to be catheterized. We leave such a catheter for from 7 to 10 days and find that it saves a lot of distress to patients, and much work to the nurses.

DR. HIRAM N. VINEBERG, NEW YORK, N. Y.—When one listens to a statistical paper of this kind one cannot but recall the fact that if you operate on two cases of complete prolapse, you know in advance that one case is likely to be successful and the other unsuccessful. So much depends upon the tissues, and whether the vaginal wall is thinned out, how much the fascia is separated, etc.

I would like to ask Dr. Baer the number of cases in which the amputation of the cervix was done? In my experience unless one does that in practically all cases the results are not particularly good. The operation in childbearing women with a certain amount of prolapse in my experience may be done in a simpler manner, and it serves the purpose very well. Incision is made just as one would for an interposition, the bladder is pushed up in the same way, but the peritoneum is not entered, and then the first fixation suture passes through the vaginal wall and fascia and in the cervix about the level of the internal os.

DR. GEORGE GRAY WARD, NEW YORK, N. Y.—One should bear in mind that it is necessary to classify the cases as to whether they are in the childbearing or non-childbearing period, in deciding which is the best procedure to follow. In the group of cases of nonchildbearing patients it is important to consider the age of the patient and one must study the individual case carefully and select the operation that is best suited for her. In other words, I think no one operation can be said to be the correct one for all cases.

Dr. Baer certainly has been fortunate in following up such a large percentage, but I note that he said from four months upward, to as long as eight years. Four months, in our opinion, is a time entirely too inadequate to judge the result of these cases of prolapse. At the Woman's Hospital we insist on two years as a minimum before we give a final classification as to the result of procidentias.

As to the choice of operation, if the uterus is a perfectly healthy one and of proper consistency and size, a Watkins operation may be the best procedure, but we do not hesitate to remove the uterus if it is not suitable. Apparently in Dr. Baer's clinic they conserve the uterus in nearly all cases. If the patient is past the childbearing age or the menopause, we are partial to the Mayo procedure for many of the cases. I believe Dr. Baer said in his vaginal hysterectomy cases

there were 100 per cent results. We do not get 100 per cent results but we get a very fair percentage with that operation.

I noticed that he had 29.5 per cent where a catheterization was necessary. We think that there is always a stasis of urine due to atony after the bladder has been extensively manipulated, and for several years we have habitually used the self-retaining catheter in all of our vaginal cases.

DR. HERMANN J. BOLDT, NEW YORK, N. Y.—I will refer only to one operation which I have missed in the tabulation given here. It is the operation devised by George Edeohls. The operation is not any more difficult than any of the others. It might take a little longer time than the Murphy operation, but the stay of the patient in the hospital is very markedly decreased. I have not had any of the cases remain in the hospital longer than one week. There is no operation, in my opinion, that equals it.

In the childbearing period the operation that has given me the most satisfactory results is ventral fixation combined with a plastic operation.

DR. ROBERT T. FRANK, NEW YORK, N. Y.—Dr. Baer's results are good. I do not think that we can claim 85 per cent of successes, but it is very difficult in this type of lesion to analyze another man's work because each case is a case to itself, and much depends on the completeness of the follow-up. That he only got 45 per cent of good vaginal plastic results surprises me. Here in the United States there are two groups, the one favoring preservation of the uterus at almost any cost, the other favoring hysterectomy as a routine portion of the operation. Abroad I think hysterectomy is rarely practiced because if the result is bad it is tremendously difficult to deal with the resulting hernia.

As Dr. Ward said, it is necessary to divide these patients into two groups, those who still desire to bear children and those who have sufficient family, or are no longer of the childbearing age. And here I want to make a mild plea for the despised pessary which received a "kick" in the *Journal of the American Medical Association* only a few weeks ago.

As to our results, we have a good follow-up; we follow between 90 and 95 per cent of the patients from three to five years before we consider the result final. Our patients in the ward are worn out by life's struggle, many have cardiac and renal complications, so that in many cases I have to choose between taking a certain amount of risk or leaving the patient unable to cope with her duties in life. We desire, of course, a short operation and yet often I cannot get along without a prolonged intervention and, therefore, necessity has forced me increasingly to use parasacral anesthesia for the vaginal part of the operation and then adding a short gas-oxygen anesthesia for the ventral fixation. Our type operation in the main is an anterior and posterior vaginal plastic, the technic of which need not be entered into here and which must be a bit different for each individual case, and, where there is uterine descent, a firm ventrofixation if no children are to be borne, or an Alexander's operation to permit of childbearing.

DR. DOUGAL BISSELL, NEW YORK CITY.—The classification of degrees of uterine prolapse made by Dr. Baer is that commonly accepted by gynecologists but to which I seriously object. It is misleading and should be abandoned.

When the uterus descends and reaches a point where the cervix only passes out of the introitus, the corpus remains within the vaginal area with the possibility of further descent. The limit of descent is reached only when the corpus has passed out of the introitus with an accompanying eversion of the vaginal walls.

All degrees of descent of the uterus are partial until the entire organ protrudes. Therefore our classification should consist of two great groups, *incomplete* and *complete*.

In the incomplete group we have two or more degrees. For convenience, however, they may be divided into first stage which would be any permanent descent of the uterus with patient in standing position, to a point where the cervix reaches the introitus. Second, where the entire cervix protrudes. In the complete group there can be but one stage.

The term "complete prolapse of the uterus," when applied to a uterus with its cervix protruding but the unattached corpus still within the vagina, is incorrectly applied because it refers to the entire organ whereas actually it includes only to the cervix.

DR. GEORGE GELLHORN, ST. LOUIS, MO.—For the comparatively small group of total prolapses in old women who are past the age of sexual relations, Dr. Baer has recommended the Le Fort operation. I would like to show two lantern slides illustrating the technic of this operation which, designed in 1876, has fallen into an entirely undeserved oblivion. What Dr. Baer said about the end-results, is quite true, as this method will avail even in cases where other procedures have failed. Another reason for recommending this particular operation for old women is that it can be performed without any inhalation narcosis. At first I used to do it under local anesthesia, but in the last year or two I have found that a good twilight sleep is all that is needed. (Slides shown.) Only when a perineorrhaphy is added, this final step requires local anesthesia.

DR. LILLIAN K. P. FARRAR, NEW YORK, N. Y.—Dr. Matthews spoke of using a retention catheter in plastic operations. It is such a radical procedure and has given such satisfaction that I would like to speak of it in more detail. We used this method at first in order to keep the interns in bed after radium had been applied and the vagina tightly packed. We began to use it later for preventing colon bacillus infection in cases of retention of urine.

There was no staphylococcus or streptococcus infection observed from leaving a catheter in the bladder. There was no case of stasis where the catheter was left in for seven days. It has been of the greatest comfort to the patients, since they do not have to be catheterized. The method has saved time for the nurses. The important thing about it, however, is that there has been absolutely no infection resulting from leaving the catheter and not one pyelitis in the 70 cases.

DR. BENJAMIN P. WATSON, NEW YORK, N. Y.—In regard to the retention catheter, I have used it in these cases as a routine for over ten years and I think it is useful in several ways. First, if one is operating on a cystocele and has done a reconstruction of the fascial support of the bladder it is important that the strain should be kept off the sutures by preventing distention of the bladder, and secondly, it prevents infection of the bladder. I think more damage is done to the pelvic floor by catheterization of the patient than by any other single procedure. One does not realize perhaps the difficulty the nurse has in catheterizing a patient on whom a repair of the pelvic floor has been done. I am perfectly certain that many of the bad results, especially on the anterior part of the pelvic floor repair, are due directly to traumatism during catheterization. The retention catheter for three or four days is, therefore, of great benefit.

DR. BAER (closing).—As to Dr. Miller's reference to the low incidence of incontinence in our series, we regard loss of urine on exertion, such as coughing or sneezing, as an impairment rather than a true incontinence.

These cases require preparation. Many of them are edematous, many of them have ulcers of the cervix, and we usually put them to bed with elevation of the foot of the bed and such treatment for the restoration of tissues as may be necessary before beginning any operative procedure. We sterilize by surgery rather than by radium. Sterilization when indicated should be positive and surgical sterilization is most certain.

We have a low incidence of operated cervical pathology; 54 patients out of 212 in whom the hypertrophy, etc. required amputation or plastic. I agree that this is lower than the percentages in the literature. Dr. Jeff Miller's series is about the same as ours. Dr. Hermann Grad had a 66 per cent cervical amputation; Dr. Phaneuf had 79 per cent, yet I think that is largely a matter of interpretation. Some of us regard a cervix with shallow bilateral lacerations as harmless and do not believe that it requires repair. This may account for some of the discrepancy.

Intelligent selection of cases is, of course, the fundamental factor in the determination of the type of operation.

I agree that our shortest time for the followup may not have been long enough to justify inclusion of these more recent patients in the series, but since all our end-results were evaluated personally by the same group of operators, their judgment of the outcome should be trustworthy half a year after operation.

Epidermoid Carcinoma of the Cervix Uteri: A Histologic Study to Determine the Resemblance Between Biopsy Specimens and the Parent Tumor Obtained by Radical Panhysterectomy, DR. KARL H. MARTZLOFF, Portland, Oregon. (By invitation.) (For original article, see October issue, p. 578.)

Cervical Cancer, End-Results of Treatment by Radiation Therapy, DR. WILLIAM P. HEALY, New York, N. Y. (For original article, see October issue, p. 594.)

DISCUSSION

DR. CURTIS F. BURNAM, BALTIMORE, MD.—As Dr. Martzloff presented his paper the question occurred to me as to how the tissue was taken in the biopsy. It is necessary to take a good deal of tissue and perhaps from deeper and various parts of the tumor if we are going to use the cellular classification in deciding on the outcome and choice of treatment.

So far as the coincidence of radiosensitivity and cell type is concerned, my own experiences have been very much like those of Dr. Healey. However, I think that a little caution should be observed both in prognosis and in treatment in deciding on the malignancy of any growth by its cell structure. One can ascertain certain general trends and certain general effects, but will find exceptions that are not so very uncommon. A histologic picture indicating low grade malignancy sometimes is associated with a high grade of clinical malignancy. Such tumors may be radiosensitive or not. In my experience this variation occurs in all the epitheliomas, but is commoner in the adenocarcinomas of the cervix. A recent case presented the histologic characteristics of papilloma, and yet rapidly metastasized over the body.

In radiating carcinomas of the cervix there are certain cardinal factors. The first is concerned with the distribution of the radium, the intensity of the treatment, duration of treatment and question of dosage. The second is to know whether or not there is secondary bacterial infection present in the cervix; wherever possible all cases should be preliminarily treated to get rid of such infection, particularly the streptococcus varieties. The third is the histologic grade of malignancy, and the fourth, while imponderable, is all important, that is the natural resistance of the patient to the growth, also the ability to tolerate radiation. So far as I know there is no method of determining in any case this factor, but it is a very important one in the outcome of treatment.

DR. ROBERT T. FRANK, NEW YORK, N. Y.—It is well not to be confused by different terminologies, or by different points of view. After all, when we view the cancer question today it is well to look back quite a distance in medical annals. When I think of the classification of cancer I am always reminded of the celebrated Trousseau's description of tuberculosis in which he covered pages with the pathology of different types of diseases that were then suspected to be tuberculous. If we ever learn to know what the cause of cancer is, our point of view will be quite different and we will no longer be so uncertain in analyzing or classifying the different reactions of epithelium to this parasitic or whatever cause it may be.

I agree with Dr. Martzloff that biopsy is disappointing in cataloguing tumors no matter how extensive the biopsy may be. Even examining many areas of a completely excised tumor leaves you in difficulty when deciding in which class it belongs. I do not operate for carcinoma of the cervix. I have not done so for many years, and I no longer have this material at my disposal. I cannot agree with the authors who attempt to establish a malignancy index and the reason that I consider such an index fallacious is manifold, part of the causes being enumerated by Dr. Burnam. Besides the morphologic degree of malignancy, evidenced by the number of cells and their mitosis, the stroma and amount of connective tissue reaction, and the as yet unanalyzable response of the patient must be taken into consideration. Consequently, the value of biopsy must be limited to making a diagnosis of the presence or absence of malignancy. Any further deductions as to the extent of invasion and the prognosis should be based on the extent of the disease and on local conditions rather than upon a purely pathologic basis. Sometimes when there is a marked malignancy so far as the cellular pathology would indicate, the radiosensitivity, at least in contradistinction to the surgical results, is such that the worst looking tumors under the microscope may give the best results.

DR. WILLIAM P. GRAVES, BOSTON, MASS.—The figures given by Dr. Healy are astonishing. His report renews the hope, that I had once formed and later given up, that the differences in cell-type of cervical cancers would be of great clinical importance in determining the nature of the treatment.

What I am about to say represents the conclusions reached in our clinic from our own observations and those of others. Dr. Healy's figures are much more definite than those compiled at the Free Hospital for Women by Dr. Smithwick and Dr. Pemberton and reported by Dr. Pemberton to this Society two years ago. Our figures were so little convincing that we abandoned the idea that the differentiation theory is of any great practical value in the radium treatment of cervical cancer, and we have subsequently paid small attention to it.

Our viewpoint has been somewhat as follows: We question, whether there actually exists a specific radiosensitivity of the cancer cells based on cell-type. The evidence of such a cell-quality is only empirical and circumstantial in that it is deduced only from the clinical results of radium treatment. The so-called radio-

sensitivity of a given tumor is synonymous with its amenability to the effects of radium. Now this latter may, as Dr. Healy and others believe, be due to an innate variable sensitiveness of the cancer cell to radiation, or, on the other hand, it may conceivably be the result of numerous other factors of the mechanical or constitutional nature that have little to do with cell-type. Dr. Burnam has referred to this in his discussion.

That there are other important factors was brought out by Smithwick and Pemberton in our series. They both found, for example, that the amenability to radium of a given cervical cancer depended more on the relative preponderance of connective tissue in the tumor than on the cell-type. I would like to ask Dr. Healy if he would not agree that the presence of connective tissue is a protective agency in limiting the spread of the disease, and in offering a better chance for cure from radium?

Secondly, a word should be said regarding adenocarcinoma of the cervix. Dr. Healy did not mention this type of cancer in his paper. Why is it that adenocarcinoma of the cervix is particularly radio-resistant? Regaud even recommends operation in these cases in preference to radiation. Is it not reasonable to suppose that its resistance to radium is due to the fact that it is peculiarly invasive or endophytic in character and, taking its origin higher up in the cervix, is consequently less accessible to the radium rays?

There is a third disturbing fact that throws some doubt on a special radio-sensibility of cell-type. Why is it that adenocarcinoma of the body of the uterus is not amenable to radium treatment? This radio-resistance cannot be the result of cell-type, since metastases of the same tumor in the vaginal wall are extraordinarily susceptible to direct radiation, as we have repeatedly been able to show.

The inference that we have drawn from this experience is, that cancer of the body of the uterus is radio-resistant simply because its disadvantageous location prevents the adequate application of radium rays.

Early accessible cancer of the cervix is amenable to several methods of cure other than radium, all of which are purely mechanical in their action.

In a recent review of cervical cancer cases at the Free Hospital for Women dating back to 1875, we have found five patients treated by high amputation and cautery, of whom two lived for more than 10 years, three for more than 20 years; one is still living 40 years after operation. In three of these cases including the last named, diagnosis was confirmed by biopsy, and in the other two the pathologic description leaves little doubt of the diagnosis.

It has been my belief that radium when properly applied to cancer cells, kills them as surely as does the knife or cautery irrespective of whether they are anaplastic or adult, spindle or spinous, unripe or ripe; and in the last analysis there is no more justification for the expression radio-sensitivity than there would be for knife, or cautery-sensitivity.

DR. JAMES E. KING, BUFFALO, N. Y.—Three important points are often overlooked which if considered will not infrequently give a hint as to the prognosis and treatment. It is a well recognized fact that the younger the patient the more rapid the growth and the more extensive the lymphatic involvement. The second point is the type of tumor. The infiltrating type is more likely to have early metastases and will often, even in an early growth, show wide lymphatic extensions. The third point is also very important, and that is that intangible something, call it immunity or resistance or what you will, but that something that resides in all of us which when present helps to determine a cure, and when absent is one of the factors that gives rise to early extension and recurrence at the point of local growth.

Dr. Healy has touched upon the question of lymphatic extension where the local tumor has been cured. I would like to show one slide which will illustrate fairly well this fact. This patient was in the early forties when there was discovered a very early, infiltrating type of carcinoma. She was treated by radium and eight months before her death she complained of vague pains in the abdomen. It was only two months before her death that the pelvic involvement was found. At autopsy was found the small shrivelled uterus; bladder, rectum and adjacent tissue were not involved, but the entire retroperitoneal tissue was a complete mass of carcinoma, the abdominal vessels being completely surrounded by this extensive growth. This is the third case of this kind that has come under my observation and all of them were early cases and gave clinically and microscopically a perfect local cure, and yet the involvement of the retroperitoneal tissues was extremely extensive.

DR. GEORGE GRAY WARD, NEW YORK, N. Y.—I wish to show four slides which give the results that we have obtained at the Woman's Hospital by irradiation of the cervix. These are five year results in 1920, 1921 and 1922. Two years ago we reported at the meeting of the American Medical Association our results and since that time we have two more five-year series and we have been able to continue the follow-up on the cases previously reported.

In primary carcinoma of the cervix treated with radium alone, our five-year end-results of all classes show 24.6 per cent of the cases traced and 23.1 per cent treated living today. Of the early cases class I and II we had 56.7 per cent traced and 53.1 per cent cases treated living after 5 years.

DR. HEALY (closing).—Both Dr. Burnam and Dr. Graves referred to the question of adenocarcinoma. We did not touch upon that subject at all. We were discussing only epidermoid carcinoma of the cervix which represents about 96 or 98 per cent of all primary cancers of the cervix in our experience. In only 2 to 4 per cent are adenocarcinomata of mucous gland origin found. There are quite a number of errors in diagnosis, however. Cases that are called adenocarcinoma of the cervix are often not true adenocarcinoma but are secondary to adenocarcinoma of the corpus or are secondary structural variations in primary epidermoid carcinoma of the cervix that resemble adenocarcinoma.

Of the early cases in Dr. Bailey's list that we reported, two were adenocarcinoma of the cervix and have remained well now for seven years.

We think that one of the important things that our study brings out is the decided difference between surgery, which is a purely mechanical agent, and irradiation therapy which is a biologic agent. Therefore, the results in surgery are always going to be handicapped tremendously by the malignancy of the tumor cell under consideration and we feel that our study makes this suggestion to the man who still feels that he must do a hysterectomy: if he wishes to improve his results he will be wise to have biopsy specimens of his cases first, and if he finds that the case is in the third or so-called anaplastic group he should avoid operation on that case. The surgical results are poor in that group.

DR. ARTHUR H. CURTIS, CHICAGO, ILL.—Dr. Graves stated that it is his belief that radium gives unsatisfactory results in carcinoma of the body of the uterus. My understanding has always been that operation yields such fine results that we need not turn to radium. In those instances in which operation has been contra-indicated and in which we have employed radium in treatment of corpus carcinoma our results have been very satisfactory. I wonder whether the experience of others is in accord with Dr. Graves' statement?

DR. WILLIAM P. HEALY, NEW YORK, N. Y.—We believe that there is a limited number of cases of adenocarcinoma of the body of the uterus that will respond to radiation satisfactorily but you must divide adenocarcinoma of the body of the uterus into two types: the so-called superficially growing adenocarcinoma which is not an invading type of tumor; and the infiltrating adenocarcinoma which quickly extends into the lymphatics and throws out distant metastases. The first group responds well to radium; the second group represents essentially a surgical condition.

The Surgical Treatment of Sterility, DR. WILLIAM KERWIN, St. Louis, Mo. (By invitation.) (For original article, see p. 641.)

DISCUSSION

DR. BROOKE M. ANSPACH, PHILADELPHIA, PA.—As a basis for my remarks, I took the 46 cases of sterility consecutively seen in private practice since we began to use the Rubin test in 1923 until November of last year. I have followed all but two. I excluded all in which a preliminary test showed the husband unfitted for procreation; all in which sterility was simply one of a group of symptoms and



Fig. 1.



Fig. 2.



Fig. 3.

not the chief complaint; all with gross pelvic disease and manifest pathology, and all in which the sterility had not lasted for the accepted measure of time—in the absolute cases, three years, and in the secondary cases, two years.

A small part of the treatment was surgical; most of it consisted in the use of alkaline douches preceding coitus, elevated hip posture, local treatment of infected cervixes, calcium lactate, etc. Five times we dilated the cervix and used a stem. Once we shortened the round ligaments and elevated much hypertrophied ovaries. Four times we did a salpingostomy. The results show that if you give the sperm and the ovum half a chance they will do the work.

There were 26 Rubin positive tests in this series and pregnancy occurred in 17. Dr. Thos. R. Morgan, who does the Rubin tests for me, reported 6 modified positive cases, that is: a small opening on one side and occlusion on the other. In this group, there was one pregnancy; two had questionable early miscarriages. The result of the 17 pregnancies in 24 Rubin positive cases was a healthy child at term in ten; normally pregnant at present—one patient at two months and one at four months; four early miscarriages and one cesarean for toxemia at the seventh month. In judging a patient sterile, we made sure that persistent efforts had been made to become pregnant.

In regard to the efficacy of the treatment we advised, we cannot draw sweeping conclusions because four of the patients went three, and one patient four years before she became pregnant; meanwhile they had stopped doing what we advised

or did it only in a desultory way. In seven of the cases, however, conception occurred within seven months.

The outcome of attempts to open the tubes has not been satisfactory in my experience. Being unaware of the excellence of Dr. Kerwin's and Dr. Gellhorn's work, we tried to find a plan of operation which would assure a permanent passage-way between the ovary and the tube, especially applicable to those cases in which the obstruction occurred at the outer extremity. My associate, Dr. Alfred Heineberg, devised such a plan, in which he opens the bulbous extremity of the tube and partially buries the ovary within it. (Figs. 1, 2, and 3). A sodium iodide picture taken six weeks after Dr. Heineberg's operation showed that one of the tubes was open, so that his plan evidently was successful in so far as maintaining a communication between the tube and the peritoneal cavity as well as the surface of the ovary; subsequent circumstances have withheld the possibility of conception in this case.

All of the salpingostomies that I have done have been failures, partly at least because the occlusion has recurred. I would be inclined to think that the inlaying of the strands of catgut must be a considerable factor in the large proportion of successful results reported by Dr. Kerwin. I have never urged the operation of salpingostomy. I had one very distressing experience. In this case the injection of sodium iodide was followed by a great deal of pain. The temperature, however, was elevated only for a few hours and rapidly subsided and I operated within two weeks. This patient developed a streptococcus peritonitis and died within 36 hours. There is a real danger in these operations unless we take the greatest care to be sure that there is no lurking infection in the tubes. I would not operate again in such a case until two months had passed after an iodide injection.

DR. JOHN O. POLAK, BROOKLYN, N. Y.—Dr. Kerwin's results are rather remarkable. We have performed this operation 51 times and we have had seven successes with ten babies as a result. The point made by Dr. Kerwin, and which should be emphasized, is the selection of cases. There are two classes of cases in which this operation is applicable: One, the hydrosalpinx where the abdominal ostium is closed by a perisalpingitis as the result of an infection in the peritoneum; and the other, the gonorrheal case which has not been complicated by a mixed infection. Some good results may be obtained in these two groups of cases. With infection of mixed origin the failures will be frequent.

Dr. Kerwin's technic is similar to that which we have used. I would call particular attention to the point he made regarding preoperative preparation. The check-up of the sedimentation time, the injection of milk in cases with a gonorrheal history, all contribute to the success, and success depends upon just these two things—the selection of the case and the dexterity of the operator.

DR. J. C. LITZENBERG, MINNEAPOLIS, MINN.—If the accepted definition of the genius is correct, "the power of taking infinite pains," it requires a genius to treat sterility, for if there is anything that requires infinite painstaking it is the solution of the problem of the sterile woman. We are too apt to think in terms of our failures instead of the small percentage of our successes. Anyone who obtains 25 per cent of successes in any procedure for sterility has a success, and yet in discussing this paper we might say that Dr. Kerwin failed in 75 per cent of his cases. That is the way the profession is apt to look upon anything that we propose for the handling of cases of sterility.

Some years ago I advocated studying all women who were sterile to find out whether they had a low basal metabolism. So far as I know, the medical profession has not accepted my ideas very enthusiastically. I am achieving a 25 per cent

success only, but I am not discouraged. During this last year we have treated 15 women with a low metabolic rate and we failed in eleven, although I look at it in a different way that is, that we have succeeded in four and thus have created four exceedingly happy families.

What Can We Learn From a Study of Mortalities? DR. JOHN OSBORN POLAK, and DONALD G. TOLLEFSON, Brooklyn, N. Y. (For original article, see October issue, p. 600.)

DISCUSSION

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—I have not made such an extensive analysis of the cases that I have to report and my analysis is limited practically to the fatalities. I agree very heartily with Dr. Polak so far as preoperative study of the cases is concerned. In some elective operations however it seems advisable to undertake the operation in spite of unsatisfactory conditions that have been discovered at the preliminary examination.

I have brought several sets of figures for comparison. The first group represents 190 cases comprising abdominal operations of different kinds in private gynecologic practice. The fatalities were a little over 3 per cent. The only fatality that resulted from what might be considered an elective operation was in a young woman who had been thoroughly studied and had been in apparently satisfactory physical condition. She had a rather large interstitial fibromyoma and was very desirous of having her uterus conserved. In this case a myomectomy was done and she subsequently developed a wound infection and later a peritonitis and died on the fourth day. The other cases of death in this series would hardly be considered as elective procedures. There were two interstitial pregnancies, one volvulus, one ruptured uterus and one bilateral hemorrhagic cyst. In addition to the laparotomies in the private series there were 358 vaginal operations, not including treatments with radium, in which we had no fatality. There were 548 cases in all with a mortality of approximately 1.1 per cent.

I have another series from the Minneapolis General Hospital, which represents a very diversified service, especially so far as the staff is concerned, no one man operating on any large proportion of the cases. In this series we have a total of 363 laparotomies with 19 fatalities, about 5.5 per cent. There were 51 hysterectomies of various types, with two deaths; one with a general peritonitis and the other from surgical shock. In 60 cases there were various types of uterine suspension, with three deaths or 5 per cent. There were various types of salpingectomy in 189 cases with 6 deaths, making a percentage of 3.2. One of these was from a fulminant streptococcal peritonitis, one from peritonitis, one from pulmonary embolism, one from secondary postoperative hemorrhage, one intestinal obstruction, and one a paralytic ileus. We had 19 extrauterine pregnancies. We had, aside from the laparotomies, 523 minor operations with 0.6 per cent of fatalities.

DR. JOHN FRASER, MONTREAL, CANADA.—Of the many interesting facts which emerge from this highly important study which Dr. Polak has presented to us, two stand out preeminently:

First, the importance in a clinic of any size of establishing definitely on a firm footing what is and what should be a relatively satisfactory operative result.

In our clinic during the period which has been passing under review we have had 2281 major operations with 67 deaths. This is our complete mortality in these operations, a mortality which works out at about 2.4 per cent, and this

mortality seems to me a justifiable one. In a complex clinic it is difficult to regulate the admissions, and with the great variety of cases admitted, some of which demand immediate attention we are bound to have a mortality over which we have not a complete control.

The second point I particularly want to emphasize is the importance of as prolonged a stay in hospital prior to operation as possible. We have had in our clinic for a long time a custom which possesses certain advantages. For instance, patients admitted for the purpose of abdominal operation are encouraged and are made to remain in bed for a definite interval, lasting at least four days, and preferably in certain cases, such as fibroids, for a longer time. Especially if the patient has suffered from hemorrhage, I do not think you can have too long a preoperative period. During this quiet interval it has been our custom to undertake a thorough general examination, frequently done by a trained internist. In this manner not only do we detect definite organic changes outside the genital area, but we are hoping there will be developed a system whereby we can sort out that unfortunate group in which we get the mortality. There is no question that there is a certain group of patients where one has made a careful examination and has been very careful at the operating table, and yet we meet with a tragic issue.

I realize with Dr. Polak the advantage of the blood count and the usual laboratory tests. The anesthetic in our clinic is administered by a trained anesthesiologist. We usually use gas and oxygen followed by ether.

DR. JOSEPH L. BAER, CHICAGO, ILL.—I wish to emphasize three points: First, the prolongation of operation. Dr. Polak showed on the chart that ninety minutes for the combined abdominal and plastic operation was safe. One method of shortening the time of combined operations would be to control the cervical condition at another time. That is usually a longer part of the vaginal work than any other and the cautery could take care of cervical pathology in many instances, either at some interval before the operation or several months after the main operation.

Second, the point that routine appendectomy is pernicious. I believe we cannot emphasize this too strenuously.

Third, the value of the sedimentation time as an indication of the absence or presence of infection. We are adhering to the sixty minute time.

DR. JOHN O. POLAK, BROOKLYN, N. Y. (closing).—The gross mortality in this series was 2.6 per cent and I am glad to hear that Montreal has a mortality of 2.4 per cent. We believe the mortality in elective procedures should be less than 2 per cent.

I wish to call your attention again to several points which were very rapidly passed over in the paper. First, as to the significance of blood change. Patients with leukopenia who had a white count of less than 7000, have shown a very much stormier convalescence than those with a normal blood picture.

Another important point is the significance of the sedimentation test. In the sixteen cases which we classed in the fulminating type of infection, there were twelve cases with lesions which showed inflammatory activity. Every one of these cases had a low sedimentation time and should not have been operated if we had adhered strictly to the 60 or 90 minute rule. I think 60 minutes is perfectly safe.

Our cases of embolism have been in the patients with low hemic content. Since we have transfused our patients whenever the hemoglobin is below 50 per cent and have insisted that all fibroids should have a longer period of rest in bed prior to operation, we have had fewer emboli. Since we have abolished the use of clamps

on the broad ligaments prior to ligating them, the incidence has been less. The woman who has a pronounced secondary anemia is more apt to have embolus because a small amount of infection is more serious to her. The woman who rests in bed increases her resistance. Embolus has occurred where omental adhesions have been extensive and trauma has been done to the omentum.

I feel we should all come out frankly and state our stories. We are always quoting our successes but seldom review our failures. It is very comforting to know that clinics like those of Drs. Chipman, Ward, and Adair also have an operative mortality.

Clinical Results Obtained With Oxytocin and Vasopressin, the Recently Isolated Principles of Pituitary Extract, DRs. GEORGE GRAY WARD, EDWARD C. LYON, JR., and GEORGE S. BEMIS (by invitation), New York, N. Y. (For original article, see p. 655.)

DISCUSSION

DR. N. S. HEANEY, CHICAGO, ILL.—I would like to ask whether an inspection of the cervix was made in all these fifty cases to rule out tears of the cervix?

DR. F. C. GOLDSBOROUGH, BUFFALO, N. Y.—There has been a great deal of work done by the profession with pituitrin but without much agreement. Dr. Abel and his coworkers agreed not so many years ago that there was only one substance in pituitrin. The research department of a chemical manufacturing concern has concluded there are two principles and I think we should wait until we get proofs from pharmacologists before we accept these two substances.

I do not think that the slight blood pressure rise shown by Dr. Ward is particularly objectionable. There is a decided drop in blood pressure immediately after the delivery of the child and if pituitrin has any particular effect on raising the blood pressure it will not raise it to the point of being dangerous. The differences shown in this small series of cases are not so very striking as to show an advantage of the oxytocin over the old pituitrin preparations. As a depressor substance it is not of much value in obstetric work.

DR. JOHN O. POLAK, BROOKLYN, N. Y.—We have been making a study of this subject. First we made a study of the normal drop in blood pressure after labor and we found that the drop, except in toxemic cases, was a minor factor, a fall of from 10 to 15 points. In the toxemic cases we have seen a drop of from 30 to 100 points.

In the study of the two drugs we have not used the two ampoules as suggested by Dr. Ward but only one. In observations with one ampoule in 60 cases, 30 with pituitrin and 20 with oxytocin, we have found that there is little or no difference except that in the 30 cases in which oxytocin was used the blood loss was greater. In these cases the cervix was inspected.

In the third stage of labor in toxemic cases I do not believe that there should be any fear in using pituitary extract because its action is so transient.

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—The point which should be kept in mind is that there seems to be considerable variation in the action of pituitary extract on both blood pressure and uterine contraction. This extract presumably contains both the oxytocin and the vasopressin principles.

DR. WARD (closing).—I wish it clearly understood that we have not advocated the use of oxytocin in this paper. We were asked to make a comparative study and

in the limited time at our disposal we were able to select only 100 cases in order to test out the two products. We have simply recorded very carefully our observations and had the charts made. We do not in any way advocate the advantages of one drug over the other, but are simply presenting it as a clinical study and as it appears to us in this very small series.

We observed that the differences were very slight, as Dr. Polak did. In the first series of 48 cases the difference shown in the effect of these drugs was slight and in the last series we doubled the dosage on this account.

Replying to Dr. Heaney's question it has always been our custom to carefully inspect the cervix, for we believe that there is a distinct advantage in taking care of laceration of the cervix at that time. In other words, in this series there was no case where there was any bleeding at all that came from the cervix.

Endometriosis Following Salpingectomy, DR. JOHN A. SAMPSON, Albany, N. Y. (For original article, see October issue, p. 461.)

DISCUSSION

DR. JAMES A. CORSCADEN, NEW YORK, N. Y. (By invitation).—Of the many points of interest in the biologic relation of this study to the subject of anaplasia, the similarity and yet the dissimilarity between the malignant and benign growths, there are three points that attracted my interest. First is the importance of proving or disproving the endometrial nature of these growths and certainly the great importance that this particular presentation has upon the evidence that endometrial tissue may be freely transplanted, that is, using the term of the plastic surgeon, free transplantation as against the pedicle transplantation. Should they be considered as resulting from free transplantation? I feel that the certain determination of the endometrial origin of these growths is important, because all endometrial tissue may easily be destroyed either anatomically or radiotherapeutically. This fact applies particularly to the extensive infiltrating endometriosis cases rather than to the simple chocolate cysts. Mutilating operations requiring resection of the intestine, broad excisions of the rectovaginal septum, seem to me to be unnecessary if it is certain that these are endometrial growths. Sterilization will accomplish what now is done with these severe operations. The only indirect evidence I have is offered by two cases in which operation was abandoned because of the extensive infiltration. Subsequently these patients were sterilized by irradiation and from 2 to 5 years they were symptom free and did not present on physical examination any evidence of infiltration.

The study of this endometriosis problem is very interesting. One reads the literature and notices that there is an enormous amount of direct evidence that spread by contact is common. The proof that there is an actual flooding of endometrial tissue from the uterine cavity out into the abdomen is less certain and in this respect I regard this present communication of Dr. Sampson's as most important. While to me he has not absolutely shown that these transplants were entirely separated from their circulatory supply, nevertheless the evidence here presented tends to show that some of them were and that the route of the endometrial transplants from the endometrium or the tubes toward the endometrial cavity has at last been shown.

The last point covers the case of a tumor which I lifted from the vaginal wall about 3 cm. below the level of the cervix, 1 cm. in diameter, covered completely by the vaginal mucous membrane but adherent to it. The woman had had no children and there had been no extraordinary trauma. She had had a myomectomy some years previously. The structure of the tumor showed a fairly large amount of

smooth muscle stroma surrounding typical small gland-like spaces, with more or less typical stroma of the endometrium, and after a long study it was pronounced adenomyoma. It is difficult for me to see how there could have been a free transplantation of this tumor in the absence of trauma to the mucous membrane and in view of the circuitous route it would have followed had it been transplanted through either the lymphatics or the blood stream.

DR. NOBLE SPROAT HEANEY, CHICAGO, ILL.—I am getting used to the sensation of coming to these meetings year after year and finding that Dr. Sampson has again outthought us and has a convincing explanation for a clinical phenomenon for which we have had some satisfactory explanation other than the truth.

When I was with Rosthorn in Heidelberg and later in Vienna I heard him advise the excision of inflamed tubes rather than amputation in order to avoid the painful nodules occasionally found in reoperated patients. Since then I have avoided amputation for this reason.

I have had two cases of endometriosis of the abdominal wall where previously only salpingectomy had been performed. In both cases the uterus was firmly adherent by one or both horns to the incision line. One of these cases had a menstruating scar, but I am sorry to say I failed to make a thorough examination of the uterine horns.

Dr. Sampson refers to the two cases which I reported in 1925, of endometriosis of the laparotomy scar following incision of the fundus to remove gestation products. He feels that if a study were made in such cases endometriosis of the uterine scar should be found. I do not know whether this would be true or not. I did not open the peritoneum in these two cases, at least not widely enough to inspect the pelvic organs. Neither had symptoms suggestive of that at the time of the operation. Case one considered me directly responsible for her endometriosis and has passed from observation. Case two I have subsequently operated upon for fibromyoma with menorrhagia. The uterus was removed vaginally and no area suspicious of endometriosis was found in the uterus, though the normal appearing uterine scar was not microscopically studied.

I support Dr. Sampson in his recommendation to perform salpingectomy with the cautery. I have used the light nasal loop in treating such cases of endometriosis where I was anxious to conserve childbearing. Where I encountered lesions that were small and isolated or where they were superficial and could not be easily excepted I have used the nasal snare quite freely. At Dr. Curtis' suggestion I have observed their postoperative course and convalescent period most carefully and I have seen nothing to indicate that the cautery is harmful.

I have been opposed to operating upon cases of postoperative residual pain in the lower abdomen for "adhesions" if I could find no palpable difficulty under anesthesia and if the patient gave no evidence of constricted bowel or ureters. Dr. Sampson has found that among the so-called adhesion cases a moderate number owed their symptoms to unsuspected endometriosis. I shall study my cases more thoroughly and may operate at least upon those adhesion cases having dysmenorrhea even though not typical of endometriosis.

I had one case of endometriosis of the vagina following a plastic operation. I had done previously a curettement and high bladder advancement and the endometrioma was small and in the advancement scar.

I also am surprised at the infrequency of endometriosis of the laparotomy scar following cesarean section and have wondered if the infrequency might in some way be associated with that katabolic phenomenon called involution of the uterus.

In conclusion I would say that it looks to me as if the opponents of Dr. Sampson's etiology of endometriosis are in an inextricable corner.

DR. EMIL NOVAK, BALTIMORE, MD.—Each year Dr. Sampson gives us something more to think about in connection with his work on endometriosis and, as he himself says, “a few targets to shoot at.” As he showed his slides I was impressed by the fact that I could duplicate practically every one of them in our own laboratory from sections, not of tubal stumps, but of the interstitial portions of tubes which had not been removed but which were still attached to the uterus. This is particularly true in connection with salpingitis, especially of the type commonly designated as salpingitis isthmica nodosa. With this lesion the lumen of the tube often appears to split up, so that there are many islands of mucosa, sometimes tubal, sometimes endometrial, scattered throughout the muscle tissue. Whether this is due to a proliferative change in the tubal epithelium, or whether it is to be explained by the formation of many diverticulum-like outgrowths, I do not know. Dr. Everett, who is at present handling the routine pathologic material in our laboratory, made the same observation. It would, therefore, seem that before drawing any conclusions as to these changes which Dr. Sampson has described in connection with tubal stumps, one ought to check up the observation by studies of the interstitial portions of normal and inflamed tubes.

DR. SAMPSON (closing).—The possibility that the endometriosis in and about tubal stumps found at the second operation might have been present at the first one, was considered in this study. In two of the cases mentioned in my paper, where one tube and ovary had been removed at the first operation, an endometriosis was found in both uterine cornua at the second operation. These two cases were described as those in which an endometriosis was probably present in both uterine cornua at the first operation. I do not believe that one can always determine by the histologic structure of an endometriosis in and about a tubal stump whether or not it was present prior to the first operation. When the endometriosis evidently arose from the outgrowth of the tubal mucosa from the end of the severed stump, it would seem that the operation must have been responsible for it. Endometriosis was found in or about the tubal stumps in 30 of 36 patients who had had a previous salpingectomy or tubal sterilization. The incidence of endometriosis in this situation was surely much higher in these cases than in women who had not had a previous operation. The number of cases which I have studied is too small to accurately determine the incidence of misplaced müllerian mucosa in this situation, both in women who have had a previous salpingectomy and those who also have not been operated upon.

DR. H. S. EVERETT, BALTIMORE, MD. (By invitation).—We have been making sections through the uterine cornua in practically all of the uteri removed during the past year and we have observed very frequently this same picture that Dr. Sampson has shown. I have no exact figures and have not been taking sections further out through the isthmus of the tube, so that I cannot answer that portion of Dr. Sampson's question, but it is a very frequent picture in the cornual portions of uteri from which the tubes have not been previously removed.

DR. OTTO H. SCHWARZ, ST. LOUIS, MO.—Where this actual endometrial tissue was found, was the fact taken into consideration that these cornua were stitched and therefore a considerable constriction was placed upon the lymphatics in this area? I believe it has been conclusively shown that endometrial tissue is also carried by way of the lymphatics and perhaps in the constriction of the lymphatic system this may have happened.

DR. SAMPSON.—I have not taken that into consideration.

Cyclical and Other Variations of the Tubal Epithelium, DR. EMIL NOVAK and DR. H. S. EVERETT (by invitation), Baltimore, Maryland. (For original article, see October issue, p. 499.)

DISCUSSION

DR. JOHN A. SAMPSON, ALBANY, N. Y.—I have never studied this problem and, therefore, am not in a position to discuss it. I have been much interested in the histologic study of the tubes of patients who were menstruating at the time the tubes were removed. These studies were made with a view of the possible finding of bits of endometrial tissue in the lumen of the tube and also of detecting the reaction of the tubal mucosa to menstruation. I was much interested in a cell which is frequently found wedged in between the tubal epithelial cells. The protoplasm of this cell does not stain and I, therefore, called it the "white cell." At first I found it only in the tube and hoped that it might be characteristic of tubal mucosa. Later studies demonstrated it in the uterine mucosa and in one instance in an ovarian carcinoma. The cell apparently wanders from the sub-mucosa into the overlying mucosa.

DR. EMIL NOVAK, BALTIMORE, MD.—We look upon these cells, which Dr. Sampson speaks of, as wandering blood cells. They give the impression of a nucleus surrounded by a clear halo.

DR. SAMPSON.—You do not consider them characteristic of müllerian mucosa?

DR. NOVAK.—No, we do not.

DR. SAMPSON.—I found out to my sorrow that they were not.

JOINT MEETING OF THE NEW YORK, PHILADELPHIA, AND
BOSTON OBSTETRICAL SOCIETIES

MEETING APRIL 10, 1928, IN NEW YORK CITY

DR. CHARLES C. NORRIS and DR. R. A. KIMBROUGH, of Philadelphia, presented a paper entitled **Relaxation of the Anterior Vaginal Wall**. (For original article, see page 675.)

DISCUSSION

DR. STEPHEN RUSHMORE said that the impression made by Dr. Norris' paper was very favorable, because he has suggested some of the admirable characteristics of the old-time gynecologic plastic operating of which there is little at the present time. We think chiefly of the tediousness of some of the old operations which were backbreaking to the assistants and time-consuming for the patient and operator, but were characterized by a certain precision and exactitude which is often forgotten in gynecologic survey today. Too little attention is paid to what may be called the cosmetic effect of plastic operations in the region of the external genitals.

The most important of the conclusions of Dr. Norris is that in which he calls attention to the fact that in order to carry out a satisfactory plastic operation, it is necessary to know beforehand just what the condition is with which one is dealing. Stated in this form it is an ideal impossible of attainment in plastic opera-

tions on the anterior vaginal wall, because in practice we do not find those structures which are portrayed in the books of anatomy. They speak of the urogenital diaphragm as consisting of two layers of fascia and various muscles arranged between these layers, but when we come to operate on the relaxed anterior vaginal wall ten or fifteen years, perhaps, after the first childbirth, when there have been a series of six, eight, or even ten labors, we find a condition which does not at all resemble what the anatomist has portrayed.

The possibilities of injury in the anterior vaginal wall give an ample supply of possible changes. There may be dislocation of the vagina, a tearing away of the vagina from the other structures, the vagina itself in prolapse; there may be cystocele; there may be urethrocele without any particular relaxation of the sphincter of the bladder. More commonly there is cystocele with relaxation of the sphincter of the bladder and with a certain amount of urethrocele. In the stretching of the urogenital diaphragm with a certain amount of submucous laceration, the tissue may be torn away from the bone on one side or on the other, and a reef in repairing the anterior vaginal wall may be placed in the untorn part of the diaphragm and leave unsewed the part where the lesion has taken place. It is rather difficult to recognize sometimes just where the lesion has taken place, and if it has been symmetrically distributed and there is general stretching without much localized tearing, taking a reef is perhaps the best procedure, but is not to be considered very satisfactory from the point of view of exact surgery.

Dr. Norris used the term urethrocele as applying to a condition that perhaps could not be detected by ordinary clinical examination. Does it not tend a little to obscure the clarity of exposition to use the term in that way? Urethrocele, Dr. Rushmore assumed, strictly speaking means a tumor, swelling, or lump of the urethra or containing the urethra, and if we cannot detect it by the ordinary means, that term should not be employed.

One of the ways of dealing with relaxation of the sphincter is to take up the slack by reefing, sometimes with a Pezzar catheter in the urethra. We test the success of the operation by pulling on the catheter. If it comes out easily, we have not taken up much slack; if we cannot pull it out, we have taken up too much slack and have to do it over. It is a very clumsy test but in some cases it seems to be all we have to depend on except the postoperative function.

There is another condition which may be troublesome clinically, namely, hypertrophy of the anterior vaginal wall under the urethra, which, judged by the ordinary tests is not a urethrocele,—it does not contain mucous membrane of the urethra,—but it is the thing the patient feels, or rather, notices. If the redundancy of the anterior vaginal wall is not removed at the time of operation, the patient comes back six or eight weeks later and says that the prolapse of the uterus is recurring. On examination the uterus is found to be just where it was at the close of the operation and the anterior vaginal wall, except for this small area, just below the external meatus, does not protrude. But the patient is aware of something sticking out. It is a simple thing to take off under local anesthesia. It is, however, better to take it off at the time of the first operation.

There is one point that Dr. Norris makes which cannot be overemphasized, namely, that the operation should be fitted to the surgical condition. A typical operation is useless for an atypical condition. There is no single type of operation that we can apply to all conditions of the anterior vaginal wall, in the first place, because of the anatomic conditions which Dr. Norris has considered at such length; and in the second place, because of the age of the patient, the social condition, and various other factors. So we have to take into consideration these two things: first, to find out as exactly as possible before operating just what the condition is with which we have to deal. The x-ray would seem to be a very

helpful procedure, as portrayed by Dr. Norris, in helping us to find out the condition of the sphincter.

DR. R. M. RAWLS said that Halban and Tandler describe the muscles as the most important structures which support the pelvic organs; Edward Martin describes the fasciae as the all important structure and Robert Frank describes both of these structures as equally important. The latter assigns a fixing or holding function to the intracellular connective tissue and a supporting function to the musculofascial diaphragm.

The vagina pierces the urogenital diaphragm or triangular ligament and separates it into an upper and lower segment. The urethra pierces the upper segment and with the bladder is fixed or held in the anterior wall of the vagina by the intracellular tissues described by some anatomist as the visceral layer of endopelvic fascia, which is a division of the pelvic fascia. This fascia extends from the arcus tendineus of the pelvic fascia on either side to the urethra and bladder and from the cervix to the symphysis pubis. As the urethra passes through the urogenital diaphragm the compressor urethrae muscles and holding strands of connective tissue surround it.

In 1919, Joseph Halban clarified the anatomy by describing two independent sets of fasciae, i.e., an endopelvic fascia which is continuous with the endoabdominal fascia,—a thin, wide-meshed connective-tissue structure, which in the female pelvis becomes thick sheathed,—and an individual muscle fascia which is a division of the pelvic fascia. He holds that the most important structures in the support of the pelvic organs are the muscles and their individual fasciae.

Dr. Rawls agreed with many but not all of Dr. Norris' conclusions. Halban and Tandler and Edward Martin have shown that injury to the anterior wall, causing cystocele is most often between the cervix and bladder and posterior to the ureteric ridge and trigone. The former have also shown that urethrocele is due to injury to the anterior vaginal wall near the attachment at the symphysis which results in a sliding cystocele with urethrocele. Therefore a cystocele cannot be a dragging or pulling cause an injury to the vesical sphincter which is anterior to the ureteric ridge and the trigone, the most fixed points of the bladder, but the vesical injury and the injury resulting in urethrocele occurred at the same time as the injury causing the cystocele.

Dr. Rawls likewise did not believe that incontinence of urine can be due to urethrocele with a minor injury to the vesical sphincter. The test for incontinence of urine should be made with a full bladder and for urethrocele after the patient has voided. In the latter condition a dribbling of urine will then denote a urethrocele and residual urine in its diverticulum and not be an indication of a minor injury to the vesical sphincter.

Further, in his experience a funnel-shaped urethra in a cystogram does not always indicate a urethrocele or that other operative procedure than a cystocele operation is necessarily indicated. Dr. Rawls showed cystograms of 2 cases with a funnel urethra and neither had any subjective or objective symptoms of a urethrocele. In the postoperative cystograms there was a normal urethral shadow and in neither patient anything other than a cystocele operation was done.

Further, urethrocele and incompetent sphincter vesicae was not a common complication of cystocele in a series of cases at the Woman's Hospital. From Jan. 1, 1919 to Jan. 1, 1927, there were 1,035 operations done for cystocele and in 44 (4.3 per cent) there were urethroceles and in 53 (5 per cent) there were incompetent vesical sphincters.

DR. NORRIS (closing) said that when he used the terms internal sphincter and urethrocele, he was aware that these are doubtful terms. Some anatomists claim that there is no internal sphincter, but clinicians know that when this por-

tion of the urethra is relaxed, partial incontinence is likely to be present and when the relaxation of the proximal portion of the urethra is repaired, the incontinence ceases. He purposely employed the term urethrocele in order to call attention to the fact that the lesion which caused the incontinence was in the urethra and not in the bladder.

Dr. Rawls showed an x-ray picture which apparently showed sagging of the proximal portion of the urethra and in which there was a cystocele but no incontinence. They had this same difficulty in the first pictures. The floor of the bladder is a movable structure, and when a cystocele is present it naturally sags considerably. X-ray pictures can only be taken in one plane, and unless care is taken to secure the photograph from the proper angle, the lower portion of the cystocele will be found sagging down and simulating a relaxation of the proximal portion of the urethra when the plate is examined. In other words, in taking these pictures, a few of which were shown, care must be exercised to take the x-ray from a certain level and from the same angle in each case. If this is not done, variable pictures will be obtained. Dr. Norris said he had never seen a case of the type under discussion in which incontinence was present in which the relaxation of the inner portion of the urethra was not demonstrable.

Incontinence is probably the most frequent and annoying symptom of relaxation of the anterior vaginal wall. This usually manifests itself only upon sudden increase of intra-abdominal pressure, such as is produced by coughing or straining. It is generally due to a laceration or pathologic relaxation of the internal sphincter of the urethra and is a frequent accompaniment of cystocele. It is especially prevalent among stout women in whom the intra-abdominal pressure is probably considerably greater than in thin individuals.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Ovarian Irradiation*

A REVIEW OF THE EXPERIMENTAL LITERATURE

By LEOPOLD GOLDSTEIN, M.D., PHILADELPHIA, PA.

THE rays of radium and x-rays are known to produce definite structural and functional changes in the human ovary, and experimental studies indicate that similar results occur when animal ovaries are irradiated. This paper deals with experimental investigations previously reported in literature, and is concerned essentially with the histopathologic changes produced in irradiated ovaries.

The Gyneccean Hospital Institute of Gynecologic Research of the University of Pennsylvania, is at present investigating the effect of irradiation upon the ovary, with special emphasis upon the health of the progeny. This problem is being studied both clinically and experimentally. The clinical part deals with the health of the first generation of children, while the experimental study is concerned with the influences of irradiation on the *first and second generation of animals*. In order to obtain evidence that may be used as a basis on which to predict the growth and health of the progeny born of irradiated mothers, animal experimentation is being carried on. Observations are being made on white rats that were irradiated prior to mating. The health and development of the offspring of the first two generations are being studied, in order to detect any defect resulting from the previous maternal irradiation, and the ovaries of the irradiated rats are being examined for histopathologic changes.

The whole problem is important for two reasons: Therapeutic irradiation is now being used more and more frequently during the active reproductive period of women, and in a few instances, irradiated mothers have given birth to defective children. Some observers have attributed these defects to the irradiation.

The present paper is preliminary to the experimental study on defect production now under way. It has a twofold object: first, to learn what ovarian changes are possibly produced by irradiation, and second, to estimate the rôle played by the irradiation in altering the subsequent reproductive function of the animal, and in causing defects that may occur in the young of such animals.

All the recorded experimental studies on irradiation of ovaries have been reviewed and analyzed. Attention was paid particularly to studies in which the histopathology of the irradiated ovary was

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stressed. The experimental data and the microscopic findings have been tabulated and are presented in the accompanying tables. A general summary of all the experiments reviewed is shown in Table I.

I. METHODS OF EXPERIMENTATION

Source of Irradiation.—The term irradiation as employed in this paper refers to the use of radium, of x-ray, or of mesothorium. The latter was used in only four cases. X-ray was employed in 33 experiments, radium in 13, while in 2 studies the exact nature of the agent was not described.^{10, 21} The x-ray was the agent most frequently selected because of its availability and ease of application.

Types of Animals Employed.—As shown in Table I, rabbits, guinea pigs, mice, and rats were the most frequently used, in the order named. The influence that the type of animal may have on the ovarian response to irradiation will be discussed later.

Dosages of Irradiation.—A general statement cannot be made concerning the dosages of radioactive agents employed by the various workers because of the many and divergent methods of treatment. Practically every investigator used several different dosages of the agent in his effort to produce ovarian change. Much importance apparently was not attached to dosage by the authors who instituted researches on ovarian irradiation. The multiplicity in findings and results might possibly be explained on the divergence in dosages used. Details in treatment, other than the length of x-ray or radium exposure, such as type of filter used, distance of ovaries from irradiative source and method of application must be known in order to evaluate the dosage used. Since these details are lacking in many of the experimental reports, we have not discussed dosage, except to emphasize its importance in the results obtained. This importance is exemplified in the experiments in which a 5 per cent skin erythema dose (E.S.D.) of x-ray produced no ovarian damage, while a larger dose of 20 to 30 per cent E.S.D. caused severe damage.¹⁷ In several experiments, 600 to 1200 milligram-hours (mgh.) of radium^{33, 34, 60} produced slight effect, while in several others, 3000 to 5000 mgh. resulted in severe ovarian damage.^{12, 52}

Methods of Administration.—There was apparently no plan common to the various observers in selecting the details of treatment in this group of experiments. The external application of x-ray was the method employed by practically all the investigators using this agent. In one set of experiments, the ovaries of the rabbit were x-rayed through an abdominal incision.⁴ In the first method, the treatment was given over the ovarian sites, or in the case of a small animal, such as the mouse, the whole animal was exposed to the rays.

Radium and mesothorium were applied externally in most of the experiments and internally in a few. In one series of experiments, radium salt was injected intravenously.³ In the external application, radium was usually placed over the dorsum, the loins, or over the abdomen of the animal. Several workers removed one ovary prior to irradiation in order to have a normal ovary for comparison with the irradiated one. Two workers, Forsdike and Schiffmann, applied radium directly to the ovaries through an abdominal incision. One investigator applied mesothorium intraabdominally in one case and externally in other experiments.³³

Time Intervals.—The expression "time interval" refers to the period of time elapsing from the date of irradiation to the date of autopsy and removal of the ovaries for examination. Ovarian examination was made as early as three hours and as late as 209 days after irradiation. A few investigators autopsied all the animals and removed the ovaries for study on a selected day after the irradiation. Other workers killed only one or two animals on the day selected for commencement of the study and another every few days thereafter, until all the animals were autopsied. This method provided a series of time intervals for one series of experiments.

The time intervals apparently had slight effect on the ultimate findings in the ovaries. For instance, Reifferscheid^{48, 50} found as severe changes in ovaries removed 209 days after irradiation as in those removed weeks earlier. Changes were reported occurring very shortly after irradiation. Reifferscheid reported degeneration as early as three hours after x-ray treatment. W. Müller³⁷ claimed that the changes observed by Reifferscheid shortly after irradiation were a part of the normal histologic picture. He also holds that changes do not appear until after a pronounced latent period. Forsdike, Matthews, Lacassagne and Specht in agreement with Reifferscheid report changes occurring within twenty-four to seventy-two hours after irradiation. The larger and longer exposures produced changes sooner than the smaller and shorter exposures.

II. ANATOMIC AND PHYSIOLOGIC VARIATIONS IN THE NORMAL OVARY

In order properly to evaluate the effect of irradiation upon the ovary of any animal, it is extremely important to realize the peculiarities of structure and function of the ovaries concerned. We, therefore, will discuss important points in the anatomy and physiology of the ovaries of the animals most frequently used in the experiments. The characteristics of ovulation, interstitial tissue and corpus luteum in the rabbit, guinea pig, mouse, and rat are described. Considerations of the causes and mechanisms of estrous phenomena and physiologic relations of the follicles, corpus luteum, and interstitial tissue to such phenomena, are not within the confines of this discussion. For detailed studies of this topic, the reader is referred to the numerous works of F. H. A. Marshall, G. U. Papanicolaou, L. Loeb, L. Fraenkel, and J. Sobotta.⁵⁶

Ovulation and Estrous Cycles.—It is well known that estrous phenomena and ovulation vary in certain animals. For instance, ovulation does not occur in all animals at each period of estrus. Spontaneous ovulation (i.e., without the added stimulus of sexual contact) occurs in the guinea pig and rat³¹ and does not take place in the rabbit. According to E. Allen,¹ spontaneous as well as nonspontaneous ovulation is the rule in the mouse. Heape and Loeb^{19, 30} found that the domestic rabbit does not ovulate until about ten hours after copulation. If the male is withheld at the time of estrus, the ova degenerate. If the doe is not mated after several consecutive estrous cycles, most of the older and younger follicles undergo degeneration and permanent sterility may result. Likewise, in some mice where ovulation is not spontaneous, the ovaries will contain no corpora lutea, but only atretic follicles and a few corpora lutea atretica as a result of the normal atresia.¹

TABLE I. GENERAL SUMMARY OF EXPERIMENTS

AUTHOR	IRRADIATION	ANIMAL	INTERVAL	FERTILITY	FOLLICLES
					GRAAFIAN
Aschner (2)	X-ray	Dog, rabbit			Degenerated
Bagg (3)	Radium salt injection	Rat		Present	Missing
Bergonié, Tribondeau, and Récamiér (4)	X-ray	Rabbit	1 month		Degenerated
Bouin, Ancel and Villemain (5)	X-ray	Rabbit			Missing
Brambell and Parkes (7, 8)	X-ray	3 wk. old mice	1 wk. to 3 mo.	Sterile	Degenerated
		Adult mice	2 to 73 days	Present	Degenerated
Burckhard (10)	Irradiation	Rat		Present	Not affected
Driessen (11, 12)	X-ray	Rabbit		Present	Degenerated
Eymer (13)*	50 mg. radium, 70 hr. 48 mg. mesoth., 96 hr.	Guinea pig	28 days		Degenerated
Fellner (14)	X-ray	Rabbit			Degenerated
Forsdike (15)	50-100 mg. radium, ½ hr. 50-100 mg. radium, 2-7 hr.	Cat	36 hrs. to 84 days		Not affected Destroyed by 2-hr. dose
Fraenkel, M. (16)	X-ray	Guinea pig		Present	Cystic degen.
Geller (17)	X-ray 5 % E. S. D. X-ray 20-30% E. S. D.	Rabbit, rat	2 to 5 weeks		Not affected
Halberstädter (18)	X-ray	Rabbit	10 to 15 days		Degenerated
Heimann (20)*	80 mg. mesoth., 12 hr.	Rabbit			Disappeared
Hüssey and Wallart (21)	Irradiation				Degenerated
Klein (22)	X-ray	Rabbit	6 weeks		Destroyed
Krause and Ziegler (23)	X-ray	Mouse	26 hours		Sensitive ones destroyed
Lacassagne (24)	X-ray	Rabbit	15 hr. to 4 da.		Degenerated at 14 days
Lengfellner (26)	X-ray	Guinea pig		Present	Degenerated
Levant (27)		Rabbit	14 da. to 4 mo		Degenerated
Massone (33)	Mesothorium	Guinea pig, rabbit			Degenerated
Matthews (34)	800 mg.-hr. radium	Guinea pig, and rabbit	4 hr. to 4-6 wk.	Present	Degenerated
Maury (35)	600 mg.-hr. radium	Rabbit	3 to 9 weeks	Present	Not affected in 12 ovaries
Müller, W. (37)	X-ray	Rabbit, mouse, guinea pig	2 to 3 weeks		Degenerated
Neumann (Quoted by 48)	X-ray	Rabbit		Present	Degenerated
Okintschitz (40)	X-ray	Rabbit			Degenerated
Plaut (44)	X-ray	Guinea pig			Degenerated
Reifferscheid (48)	X-ray	Mouse, monkey, dog	3 to 18 hours; 209 days		Degenerated
Robinson (51)	X-ray (170 E.S.D.)	Rabbit	2 weeks 3 weeks 6 weeks		Degenerated Degenerated Reappeared
Roulier (52)	X-ray	Rabbit, dog			Degenerated
Schiffmann (53)	6-15 mg. radium; 31 mg. mesoth., 4-21 days	Guinea pig			Not affected
Serafini (54)	X-ray	Rabbit			Degenerated
Simon (55)	X-ray	Guinea pig, rabbit			Degenerated
Specht (57)	X-ray	Rabbit	24 to 72 hours		Disappeared
Steinach and Holzknecht (58)	X-ray	Guinea pig			Degenerated
Suziura, Kanematsu, and Failla (59)	Ra. emanation 2.4 ml. curie hr.	Young mouse		Sterile	Destroyed
Tsukohara (60)	X-ray	Rabbit		Sterile	Degenerated
Weis (61)	600 mg.-hr. radium	Rabbit	Several weeks	Present	Not affected
Zaretzky (63)	X-ray	Rabbit			Degenerated

*See text for variations produced by filters.

TABLE I. GENERAL SUMMARY OF EXPERIMENTS

FOLLICLES PRIMARY	OOCYTES	CORPUS LUTEUM	INTERSTITIAL TISSUE	GERMINAL EPITHELIUM	STROMA	VASCULAR CHANGES
Degenerated	Degenerated		Theca lutein cells in- creased			
Degenerated	Degenerated	Not affected	Lutein cells degenerated	Degenerated		Sclerosis
Degenerated	Degenerated		Theca interna degen- erated			
Degenerated	Degenerated		Increased			
Disappeared	Disappeared	None present		Proliferated	Atrophied	
Degenerated	Disappeared	Not affected	Theca interna hyper- trophied	Not pro- liferated	Hypertrophied	None
Not affected	Not affected		Not affected			
Degenerated	Degenerated	Not affected	Theca cells vacuolated	Degenerated	Intact	Hemorrhages
Degenerated	Degenerated				Degenerated	
Not affected	Not affected	Not affected			Intact	
Destroyed by 4-hr. dose	Destroyed	Increased			Intact	
Degenerated	Degenerated					
Not affected	Not affected		Well developed			Congestion, hemorrhages
Degenerated	Degenerated	Not affected				
Degenerated	Degenerated					
Degenerated	Degenerated					
Destroyed	Destroyed		Hypertrophied			
Growth stimulated	Destroyed in mature follicles	Many present	Hypertrophied			
Degenerated	Degenerated					
Degenerated	Degenerated	Not affected	Increased			
Degenerated	Degenerated					
Degenerated	Degenerated		Increased after 2 mo.			
Degenerated	Degenerated				Degenerated	Congestion
Degenerated	Degenerated	Not affected		Intact		Congestion
Not affected	Not affected	Not affected		Intact		
Not affected	Not affected	Not affected		Intact	Not affected	None
Degenerated	Degenerated					
Degenerated	Degenerated					
Degenerated	Degenerated					
Degenerated	Degenerated		Increased growth of theca		Degenerated	
Degenerated	Degenerated	Not affected				
Suppressed	Few degen- erated	None found	Increased growth			
Increased	Normal	None found	Increased growth		Increased	
Normal	Degenerated		Involuting			
Degenerated	Not affected					
Not affected	Not affected					
Degenerated	Degenerated			Intact		None
Degenerated		No fresh cor- pus luteum	Growth stimulated	Intact		Congestion
Degenerated	Degenerated					
Degenerated	Degenerated	Not affected			Degenerated	
Degenerated	Degenerated		Theca and interstitial tissue increased	Intact		
Degenerated	Disappeared					
Occasional fol- licle damaged	Degenerated					
Not affected	Not affected		Not affected	Intact	Intact	
Degenerated	Degenerated		Affected last			

Where ovulation is spontaneous (i.e., in the guinea pig, rat, and in some mice), three ovarian structures are involved: the follicles, corpora lutea, forming after ovulation, and possibly interstitial tissue. In the rat, the sexual cycle consists of the first or follicular phase dominated by the maturing follicles.³¹ The luteal phase is lacking under ordinary conditions. In the rat and guinea pig, the estrous cycles are similar as far as the first phase is concerned. The second or luteal phase is present in the guinea pig, absent in mice that ovulate spontaneously and absent in the rat. The lack of influence of the luteal phase is shown in the two or three sets of corpora lutea of estrus that are present at all times in rats and to less extent in mice.

From this description, we can readily see how the normal follicular atresia occurring in the rabbit and in some mouse ovaries, and to a much less extent in rat and guinea pig ovaries may be misinterpreted for degeneration produced by irradiation.

Corpora Lutea.—According to Loeb³⁰ and Allen,¹ the corpora lutea in the mouse and rat do not prevent the maturation of follicles. In these animals, two or three sets of corpora lutea persist throughout a number of estrous cycles. This shows the inactive part the corpora lutea play in the production of estrus. The presence of persistent corpora lutea in the ovary of the guinea pig would inhibit maturation. That ovulation may be accelerated by the absence of corpora lutea was shown in experiments,⁴¹ in which the removal of young corpora lutea in the guinea pig following ovulation called forth the next ovulation in eleven days, instead of eleven to seventeen days, as would normally be expected. The guinea pig ovary usually shows only a few fresh corpora lutea. In the ovaries where persistent corpora lutea are present, mature follicles would not be found. In the rabbit, corpora lutea formation, as was previously mentioned, does not occur unless copulation and subsequent ovulation take place.

The rôle played by the corpus luteum in the estrous cycle is seen to vary in the several animals. The findings in the corpora lutea after irradiation will be explained on the basis of the normal luteal development for that animal.

Interstitial Tissue.—Interstitial tissue development is most pronounced in the rabbit, where a periodic formation of the cyclic corpora lutea is lacking, and where the greatest amount of space is available for development of an interstitial gland. The guinea pig ovary has somewhat less interstitial tissue than the rabbit. In the rat ovary the theca interna development is much less than in the rabbit.²⁹ The normal interstitial tissue growth in rabbit ovaries takes on significance in the evaluation of those reports of increased interstitial cell growth as an effect of irradiation.

SUMMARY OF ANATOMY AND PHYSIOLOGY

1. Estrus occurs in the unmated rabbit without ovulation. Ovulation occurs associated with the estrous cycles only when copulation takes place. The estrous cycle phenomena are usually associated with spontaneous ovulation in guinea pig, rat, and in many mice.
2. Many atretic follicles and corpora lutea atretica are present in the rabbit ovary and in some mice. Small amount of atresia is present in guinea pigs, rats, and in many mice.
3. No corpora lutea are present in the young or unmated rabbit.

Many sets of corpora lutea are present in the ovary of the rat and in many mice. The guinea pig ovary contains a few fresh corpora lutea of estrus.

4. Interstitial tissue in the rabbit ovary assumes gland-like proportions, while this tissue development is much less in guinea pig, and least in the rat and mouse.

III. HISTOPATHOLOGIC CONSIDERATIONS OF THE IRRADIATED OVARY

The histopathologic appearances of the irradiated ovary as described by thirty-nine observers are presented in Table I, irrespective of the methods, agents, dosages, and details of experimentation employed. All except seven of these authors report definite pathologic findings as a result of irradiation. Of these seven, only two, Weis and Burekhard, report the entire absence of damage in the irradiated ovaries. The other five, Geller, Forsdike, Matthews, Maury and Roulier, describe some degenerative changes under certain conditions of experimentation which were not present under other conditions.

The microscopic changes and appearances in the ovarian tissues will now be presented under special headings. Effects of certain types of filters on the ovarian response to irradiation will also be described.

Histopathology of the Oocytes and Follicles.—A summary of the effects of irradiation on oocytes (ova), graafian follicles, and primordial follicles is shown in Table II. Oocyte and follicular damage was found in 78 to 83 per cent of the experiments. Damage to primary follicles was reported somewhat less often than to graafian follicles. It appears as though primordial follicles are capable of withstanding exposures that affect the graafian follicles.

Ova Changes.—The ova of the large and maturing follicles were affected first. It appears that the ovum is the most sensitive portion of the follicle. Klein²² found changes occurred first in the cells of the zona pellucida. Sugiura⁵⁹ and Tsukohara⁶⁰ observed that the ovum and discus oophorus were the sites of earliest action. Brambell and Parkes discovered that all the small oocytes disappeared within two days after irradiation. Contrary to Klein, they found that the cells of the zona pellucida were persistent and remained as a mass in a small cavity long after the oocytes had degenerated and the follicles had ceased to exist.

The degenerative changes are found in the egg cells often long before the granulosa cells show changes. The nuclei of the ova present distinct degenerative appearances. They lose their round outline and the chromatin separates irregularly. The protoplasm of the ovum stains poorly and finally the entire cell disappears. Atrophy and desquamation of the flat follicular epithelium occur. Nuclear de-

TABLE II. EFFECT OF IRRADIATION ON OOCYTES AND FOLLICLES

	TOTAL EXPERIMENTAL OBSERVATIONS	DAMAGE	NO DAMAGE
Oocytes	43	36 (83.7%)	7
Graafian follicles	46	38 (82.6%)	8
Primary follicles	46	36 (78.1%)	10

Table showing frequency of damage to oocytes, graafian follicles and primary follicles, resulting from irradiation of ovaries of animals, irrespective of types of animals employed or details of treatment.

struction of the granulosa cells takes place with a resulting shriveling of the follicular cavity. Brambell⁸ observed the formation of "anovular" follicles from small follicles by degeneration of the ova and growth of the membrana granulosa cells.

Follicular Changes.—Twenty-nine x-ray experiments resulted in the production of damage to graafian follicles, and twenty-six in damage to primary follicles. Appearances other than degenerative were observed in the primary follicles in six cases. Two authors x-rayed animal ovaries with negative results in some experiments and positive results in others. Roulier⁵² observed degenerative changes in the rabbit ovary, but none in the ovary of the dog. His explanation is that the ovaries were too distant from the source of irradiation.

Two reports of growth and stimulation of primordial follicles are included in the ten negative reports (see Table II) on primary follicles. Klein reported growth of young follicles after x-ray treatment, while Robinson reported the growth of young follicles subsequent to a primary "displacement or suppression." These authors likewise found degeneration of the ripe and maturing follicles.

Three observers found that 600 mgh. of radium did not injure the follicles. Weis,⁶¹ working with rabbits, had no evidence to prove that ova and mature graafian follicles were affected. In 16 animals irradiated, the ovaries showed normal histology with follicles in all stages of development. Maury³⁵ concluded in his work on rabbits that a similar application of radium produced no degeneration, although he found degeneration of all large follicles in 11 ovaries. Matthews³⁴ reported that there were no characteristic pathologic changes in rabbit ovaries due to the action of radium rays up to 800 mgh., and that beyond this dosage the ovaries showed changes.

Severe microscopic alterations in the ovaries were described by Forsdike, Eymer, Sugiura, and Schiffmann after radium treatment. Forsdike found that 200 to 700 mgh. produced ovarian degeneration in cats, while Schiffmann³³ found degeneration after the application of 600 to 5,000 mgh. of radium in guinea pigs, and Sugiura⁵⁹ after 2.4 millicurie-hours of radium emanation in few-day-old mice.

Mesothorium produced follicular degeneration in all four cases where employed and apparently its action was similar to that of radium.

Changes in the Corpora Lutea.—The term corpus luteum as employed here refers to the cellular body produced in the ovary after rupture of the ripe follicle and expression of the ovum. We do not refer to the theca lutein cells that develop into the so-called interstitial gland tissue or "puberty" gland of Steinach and Holzkecht. The effect of irradiation on the theca interna and interstitial tissue is considered separately.

TABLE III. EFFECT OF IRRADIATION ON CORPORA LUTEA

	NUMBER OF OBSERVATIONS
1. No change	11
2. Degeneration	0
3. Absence	4
4. Increase in number	2
Total	17

Table showing resistance of corpora lutea to irradiation.

A summary of the effect of irradiation on the corpora lutea is shown in Table III. One can see that the number of reports is small compared with the entire number of experiments with irradiation. Radium or x-ray apparently produces slight effect on the corpus luteum, since pronounced degeneration was not observed. Lacassagne found the luteal cells very resistant to the x-ray. In 11 of the 17 experiments, no demonstrable effect could be found in this tissue.

We have attempted to explain the various findings reported in the corpora lutea on an anatomic or physiologic basis. The type of animal employed may explain the absence of corpora lutea in ovaries following irradiation. Three-weeks-old mice were used in one series of experiments and young virgin rabbits in the remaining four sets of experiments in which the absence of corpora lutea was observed. The absence of ovulation because of immaturity readily explains the lack of luteal tissue formation in the young mice and rabbits used. The nonoccurrence of spontaneous ovulation is the probable explanation of the lack of corpora lutea in unmated adult rabbits and in some mice.

An increase in the number of corpora lutea was reported twice. Forsdike¹⁵ found numerous large corpora lutea in sections of the cat ovary in which the primary follicles were only partially destroyed. He believes these were derived from the undamaged primordial follicles that had matured rapidly after irradiation. An increased number of corpora lutea in the rabbit ovary was associated with a stimulation of the primary follicles in one case.²² The influence of the maturing undamaged follicles may possibly explain the increased formation of corpora lutea here, because the irradiated animal was mated with a vasectomized male. Occurrence of ovulation after the stimulus of sexual contact would lead to the development of corpora lutea.

Changes in Interstitial Tissue.—By interstitial tissue is designated the tissue of an epithelioid character found between follicles consisting, not of connective tissue cells, but of cells resembling those in gland tissue. Changes in theca interna and interstitial tissue were grouped together because cells of both tissues have apparently a similar origin and were influenced similarly. According to Wilkerson,⁶² physiologic atresia of follicles is antecedent of the so-called interstitial gland. In atresia of the follicles in the rat, mouse, and rabbit, the cells of the theca (particularly theca interna) become transformed into large polyhedral cells containing lipid, and are really interstitial cells.

TABLE IV. EFFECT OF IRRADIATION ON INTERSTITIAL TISSUE AND THECA INTERNA

NUMBER OF OBSERVATIONS	
1. Hypertrophy	13
2. Degeneration	5
3. No effect	2
Total	20

Table showing power of irradiation to cause increased growth of interstitial tissue.

The important finding was the stimulation or increased growth of interstitial gland tissue. Table IV shows that increased growth of theca interna and interstitial tissue occurred in 13 of 20 experiments. It is an interesting coincidence that 9 of the cases of interstitial tissue hypertrophy were observed in the ovary of the rabbit. As was

previously mentioned, the ovary of this animal is normally the site of a large amount of interstitial tissue because of the normal atresia going on, especially in the unmated or young animal.

Aschner, Bouin, Geller, Klein, Levant, Lacassagne, Robinson and Serafini found that the hypertrophy of the interstitial tissue in the rabbit ovary was associated with the degeneration of the ova and graafian follicles. Two of the four observations on increased growth of interstitial tissue were made on the guinea pig,^{44, 58} one on adult mice,⁸ and in one observation²¹ the type of animal could not be determined by the author. Two authors^{44, 58} believe that a physiologic growth of theca interna occurred as a result of the rapid destruction of the ova cells, and follicular atresia and atrophy produced by irradiation. In the x-rayed ovaries of adult mice,⁸ the interfollicular tissue hypertrophied together with the theca interna and granulosa cells, the growth of the latter two becoming indistinguishable from it.

Graafian follicles were damaged in all the cases where interstitial tissue underwent hypertrophy. Degeneration of primordial follicles was associated with hypertrophy of interstitial tissue in 11 of the 13 reports. In two instances, increased follicular growth occurred with increased interstitial cell growth.

Interstitial cell degeneration constituted a part of the general degeneration in four cases. One author reported that involution of the interstitial gland took place when the ovary had recovered from the effects of irradiation.⁵¹

The two instances where interstitial tissue was not affected occurred in ovaries not damaged by the rays.^{10, 61}

Changes in Germinal Epithelium and Stroma.—Reference to Table I shows that the germinal epithelium is more resistant to irradiation than the stroma. The stroma was deleteriously affected in almost half of the experiments, while the germinal epithelium was damaged in only three cases. Brambell and Parkes⁷ experimenting on three-weeks-old mice found pronounced proliferation of the germinal epithelium into cords resembling luteal cells.

Vascular Changes.—Few vascular changes were reported as a result of irradiation. Congestion, the most common finding, was reported four times. Bagg found sclerosis of ovarian vessels after intravenous injection of radium salt in rats.

Effect of Filters on Pathologic Changes.—That various filters influence the reaction of the ovarian tissues to irradiation was shown by Eymer¹³ and Heimann.²⁰ The former irradiated rabbits over the abdomen with radium and mesothorium, and employed lead filters of varying thicknesses. He found that 50 milligrams of radium applied for seventy hours with filter of 4 mm. lead produced severe damage in all the ovarian tissues after a time interval of twenty-eight days (Table I). Application of 48 milligrams mesothorium, with 3 mm. lead filter for ninety-six hours produced a high-grade destruction in the ovaries examined immediately after irradiation. The theca cells were not as severely affected as with the 4 mm. filter. Application of 48 milligrams mesothorium with 2 mm. lead filter for one hundred and twenty hours, and for one hundred and forty-four hours, after intervals of nine and seven days respectively, produced practically no damage in the primary and smaller follicles. An exposure of 3500 mgh. of radium without a filter, after an interval of eight days brought about changes only in the graafian follicles. No changes were induced

in the theca, corpus luteum, primary follicles, germ epithelium, stroma and in ripe follicles. Eymer concluded from these results that the biologic activity of radioactive substances, filtered with lead, is greater than without filter, and that the length of exposure must be increased to get the same action on tissue without the use of a filter.

Heimann irradiated rabbits externally with 80 milligrams mesothorium for six to twelve hours employing filters of 1 mm. brass, 3 mm. aluminum and 3 mm. lead, and no filter in one case. With the lead filter he noticed definite ovarian degeneration while with aluminum, brass and without filter, he found none or very slight changes.

From these experiments it appears that the type of filter employed may also influence the degree of degeneration produced in the irradiated ovary as well as varying thicknesses of the same filter.

SUMMARY OF CHANGES

The histologic findings can be summarized and grouped, irrespective of the details of treatment, as follows:

Negative Changes.—In this class are included the few cases where the ovary was not injured by the irradiation. This result may possibly be explained on the grounds of insufficient irradiation, too long distance of ovary from irradiative source, influence of filters, or technic of treatment and examination.

Degenerative Changes.—Analysis of the large group of experiments in which ovarian damage was observed shows that the several tissues have different degrees of sensitivity to irradiation. Moderate to severe damage occurred in all the ovarian structures with the exceptions of the corpus luteum and germinal epithelium. Our study of recorded results corroborates in general the order from highest to lowest sensitivity described by Eymer¹³ which is as follows: (1) nuclei of ova of the largest follicles, (2) ova cell protoplasm of largest follicles, (3) inner granulosa cell layer of large follicles, (4) ova and epithelial cells of young follicles, (5) outer granulosa cell layer of larger follicles, (6) primary follicles, (7) theca interna, (8) theca externa, (9) corpus luteum, (10) vessel endothelium, (11) rest of stroma and germ epithelium. This scale only considers the susceptibility of the tissues to the destroying effect of irradiation. That ovarian degeneration is brought about by irradiation cannot be denied, but the changes produced are not constant. Furthermore, the complex structure of the ovary with its physiologic atresia, as was pointed out, may interfere with the observer's judgment of the true histologic status.

Proliferative Changes.—They include: growth of primary follicles, growth of interstitial tissue, increased number of corpora lutea, and proliferation of germinal epithelium and stroma. The significance of growth in these tissues, with the exception of interstitial tissue, is not discussed because of the presence of only a few scattered reports on these changes. Growth of interstitial tissue was found in more than half of the observations on this tissue and was associated in all cases with degeneration of graafian follicles, and in almost all cases with degeneration of primary follicles.

IV. FUNCTIONAL CHANGES OF THE IRRADIATED OVARY

We believe, that the significance of ovarian damage lies in any functional disturbance that may be produced, and that one of the criteria

of the effect of ovarian irradiation may be obtained by a study of such functional disturbance, followed by histologic examination of the ovaries. For this reason, we are presenting some experimental evidence on fertility, estrous cycle production, restoration of function, and fertilization of ova after irradiation.

Fertility in the Irradiated Animal.—Only thirteen observations were made on the reproductive function of irradiated animals in which the ovaries were subsequently studied. Animals were fertile in ten experiments and sterile in three. Fertility was observed in animals with damaged ovaries, six times and with undamaged ovaries, four times. In six experiments, a number of animals mated became pregnant, although ovarian examination subsequently showed considerable degenerative changes. The results of a few of these experiments are presented in greater detail.

Brambell and Parkes⁸ reported a series of experiments on x-rayed adult mice in which 75 per cent of the animals, killed more than five weeks after irradiation, had been sterilized. The criterion of sterility employed here was the absence of oocytes in the ovaries. Of the nine animals mated, four became pregnant following mating at two, four, six, and seven days respectively after irradiation. With one exception, the ovaries of these fertile animals were histologically unsterilized (i.e., well formed follicles were present). This exception was found in an animal mated at six days after irradiation that produced a normal litter of seven. The ovaries showed almost complete disintegration of the follicles and ova when examined sixty-seven days after irradiation.

M. Fraenkel¹⁶ x-rayed a four-days-old guinea pig, and mated it at eleven weeks. He found cystic degeneration of the follicles in the ovaries after the animal had given birth to a litter of three, nine weeks later. The young remained backward in development, and the ovaries of the nonirradiated generation also showed follicular degeneration.

Lacassagne and Levant^{24, 27} made microscopic examinations of the ovaries of 27 irradiated rabbits and found the follicular elements in a degenerated state. Lacassagne and Coutard²⁵ reported that of 51 young, born of previously irradiated rabbits, 29 died shortly after birth and the 22 lived but suffered severe intestinal disturbances.

Driessen^{11, 12} mated rabbits several months after irradiation and autopsied them eight to fourteen days after mating. The ovaries in several of the animals showed follicular degeneration; the embryos showed delayed development. He concluded that irradiation produced germ plasm damage which expressed itself later in delayed embryonal development.

Okintschitz⁴⁰ irradiated nongravid mice, guinea pigs, and rabbits and observed them after mating. The mice became pregnant, but aborted; the guinea pigs died from the effects of irradiation; and the rabbits remained sterile. Microscopically, the ovaries of these animals showed disappearance of many follicles.

These experimental results point to the possibility of continuation of the reproductive function in the presence of partially damaged ovaries.

Experiments performed by Sugiura, Brambell, and Tsukohara resulted in permanent sterility of the irradiated animals. The ovaries

of these animals showed degeneration of ova and follicles. Apparently in these experiments, the effect of the irradiation was so severe that the reproductive function was permanently inhibited.

The Estrous Cycle After Irradiation.—It has been shown that the estrous cycle phenomena continue after x-ray sterilization in mice, even though there is complete obliteration of the cyclic ovarian structures.⁴² Parkes believes that the cords of cells proliferated from the germinal epithelium are the source of estrin in the irradiated ovaries of young mice, and that the interfollicular tissue elements, having the germinal epithelium as their ultimate source, produce the estrin necessary for the estrous cycle production in adult mice.

Restoration of Function Following Irradiation.—The question how the restoration of ovarian function after a temporary cessation is to be explained, is of great interest. There are three possibilities by which this may be brought about:

1. Evidence presented by many authors points to the *growth of uninjured young follicles* as the most probable explanation for the re-establishment of ovulation. According to Fordsdike, Geller, Klein, Lacassagne, Levant, Pordes,⁴⁵ Maury, and Reifferscheid, young primordial follicles uninjured by irradiation, complete their normal growth to maturity.

2. According to Waldeyer,³⁸ the capacity of the germ epithelium to *renewal of follicle formation* is very improbable in extrauterine life.

3. *Regeneration of partially damaged follicles* was believed possible by Zaretsky and was denied by Reifferscheid. The latter, in order to learn if regeneration takes place, irradiated a series of mice and examined them months later. He found that degenerative changes persisted for months and observed no trace of regeneration.

Fertilization of Ova Following Irradiation.—Evidence showing fertilization of ova damaged by irradiation would throw light on the production of defects in the offspring. Unfortunately, we have only a few views on fertilization of the injured germ cell. Nürnberger³⁹ distinguished between phanetic cell injury which produces definite observable damage in the offspring, and genetic germ plasm injury which produces defects usually classed as hereditary. He pointed out that, from the morphologic appearance of the ovum, one cannot conclude concerning its biologic status, and believed that damage to ovary is only shown when no pregnancy follows, and if the germ cells are not damaged, then only perfect offspring will result.

F. Müller³⁶ believes in "all or none" in connection with injury to the sex gland. Either the germ cell is so severely damaged that fertilization is impossible, or if the germ cell is slightly injured and fertilization occurs, the product of conception will be healthy and not defective.

Mall³² expressed the opinion that only rarely a destruction of the germ cell or impregnated ovum is the cause at the bottom of malformation. According to Mall, monsters are developed from normal ova due to external influences causing faulty implantation of the ova.

Bagg³ concluded that irradiation of unfertilized ova may result either in completely destroying the functional activity of these cells, or so modifying their structure that the resulting offspring may be defective. According to Pemberton,⁴³ an ovum damaged by irradiation is not capable of fertilization, or if it is fertilized, probably results

in a damaged ovum which is aborted. Döderlein, Hirsch, and Ebeler (quoted by³⁸) believed that the ovula were damaged by irradiation, and partly damaged ones produced malformed embryos.

The few experiments cited seem to show that animals may remain fertile, although the ovaries are damaged, and that the function of estrus may continue, although the animal is sterile. Evidence seems to point to the growth of young undamaged follicles as the probable explanation. The question of fertilization of the damaged ovum cannot be answered since there is no direct evidence and a disagreement in the views of the few authors mentioned.

DISCUSSION AND CONCLUSIONS

Because of the divergence and variation in the details of experimentation, such as dosage, filters, types of animals, and other points of technic, it is almost impossible to arrive at conclusions regarding many of the experimental researches which have been instituted. No standard for comparison of the results can be chosen because of these variables. Most of the investigations, however, agree as to the pathologic changes produced in the ovaries sufficiently irradiated, so that it may be taken as an established fact that certain histologic changes will be found in ovaries so treated.

Conclusions concerning radiative effects on the reproductive function are difficult to draw, because microscopic studies of the ovaries were not made in any of the experiments reviewed, with the exception of the few cited. In these, fertility was present although the ovaries were damaged. Many authors have reported conclusions on functional activities following ovarian irradiation that were not based upon ovarian examination. These reports have not been included in this paper because negative results may be explained on the ground of insufficient radiation, and functional disturbances on causes other than irradiation.

Our analysis of the experimental literature has disclosed that insufficient dosage and variations in ovarian sensitivity are factors that have resulted in the great divergence of results. Our own work has shown that it has been necessary to increase greatly the dosage which we first thought would sterilize, before any important functional changes were produced. The physiologic and anatomic peculiarities of the normal ovary may explain certain appearances that were observed after irradiation.

It seems to us that conclusions regarding the effect of ovarian irradiation must be based on the study of those animals in which definite functional disturbances are produced. We believe the most logical method and the one least open to error, consists in first carefully determining the dosage sufficient to produce definite functional changes and then studying them, comparing the ovaries of these animals, or of other animals treated with similar dosage, with a control series. Minute histologic changes should not be attributed to irradiation unless carefully controlled by functional alterations, because such changes may be explained by factors other than irradiation.

It is seen from our survey, that only a few authors studied the ovarian changes in conjunction with functional ones, so that little is known of the exact nature of the effect of irradiation. Further ex-

perimental investigation is necessary in order to learn the effect of irradiation on ovarian structure and function.

From our study of the experimental literature on ovarian irradiation, we may state that:

1. The animal ovary can be damaged by sufficient exposure to radium, x-ray, or mesothorium.
2. There is apparently some stimulation of the interstitial gland tissue of the ovary which may be physiologic or a result of follicular degeneration.
3. There is some evidence that animals may retain their fertility even though the ovaries have undergone distinct degenerative changes.
4. No evidence is available to show that damaged ova were responsible for the pregnancies occurring after irradiation.
5. We believe, that the exact nature of the effect of ovarian irradiation can only be understood by studying any functional disturbances that arise after irradiation, in conjunction with pathologic changes in the ovary.

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Miscellaneous

Lundh, G.: On the Problem of Age and Primiparity. Acta Obstetrica et Gynecologica Scandinavica, 1926, iv, 137 (Suppl.).

The principal results of this elaborate study concerning 7621 primiparae ranging in age from 13 to 47 years, may be summarized under the following main heads:

The time of the onset of the first menstruation postpartum shows a regular postponement with increasing age at the first parturition, although to this delay in the appearance of the flow no great importance can be attributed, owing primarily to the unreliability of the patients' statements regarding this time.

With reference to morbidity during pregnancy, it is only the toxemias which show a moderate increase for the oldest patients and possibly a slight increase for the very youngest.

The frequency of premature labor is highest among the youngest women.

There is a definite optimum for the duration of labor around the twenty-second year with a range on either side of two or at most three years, so that from this point of view the most suitable time for a first labor coincides with a period lasting from the nineteenth up to and including the twenty-fifth year. After the latter year labor lengthens progressively with advancing years, and this fairly uniformly. In the very youngest there is also a prolongation of labor, rising with increasing years. The rise here seems to be less dependent upon the degree of complication of the labor.

Certain evidence as to the cause or causes of this proved prolongation with age can scarcely be procured through a statistical investigation. Judging from the records in the case-sheets, a number of complications more or less unfavorable to the course of labor may certainly be considered as commoner in elderly primiparae; e.g., contracted pelvis, anomalous fetal presentation, premature rupture of the membranes, etc., though these conditions cannot be regarded as the actual causes of the prolongation of labor with advancing age. Inadequate pains associated with rigidity of the soft parts, as an expression of a retrogressive age change of the uterine musculature in the women who do not become pregnant until a considerable time after the advent of puberty (disuse atrophy), may be assumed to be the principal cause of prolongation of labor.

Among the other complications of labor it is chiefly eclampsia that shows a definite increase in the elderly classes and to some extent also in the youngest.

The frequency of all varieties of operative interference as also of perineal lacerations shows a marked rise with advancing age, and is without exception lowest among the very youngest classes.

There is a prolongation of the placental stage in the elderly, and the number of interventions in this stage of labor shows a considerable increase with rising age. The youngest mothers also show a slight prolongation of this stage.

Age does not seem to exercise any influence whatever upon the weight, length, and head dimensions of the children; nor does it appear to influence the sex of the children. The frequency of twins increases with maternal age.

Infantile morbidity and mortality both show a great increase with rising maternal age.

The maternal morbidity in the puerperium shows no definite influence of age. As regards the mortality, a certain influence of age cannot be excluded, especially in respect to deaths in eclampsia.

The proved increase with years in the risks encountered by a primipara appears to manifest itself to a still higher degree in women who have been married a rather long time before becoming pregnant.

J. P. GREENHILL.

Küstner, H.: Increase in Obstetric Complications During the Last Few Years. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1927, lxxv, 524.

During the last few years, there has been an increased incidence in the cases of contracted pelvis in Germany; but this complication can be recognized early and hence, properly treated. More important, however, are the complications which may arise suddenly and one of the most serious of these is postpartum hemorrhage. Küstner reviewed the case reports of 25000 women who were delivered in the Leipzig clinic between 1911 and 1926. Among these women, 1550 lost more than 600 c.c. of blood. From 1924 to 1926 the frequency of postpartum hemorrhage among young women was between two and three times as great as it was from 1911 to 1923. The author believes that the cause of this is the damage to the genital organs which occurred during the war as the result of undernourishment. The author had previously found a great increase in the incidence of genital hypoplasia in women who were at the age of puberty during the war. When these girls reached adult life, the hypoplasia was either so extensive that sterility was the result or abortions occurred, or the hypoplasia was mild in which case atony of the uterus or postpartum hemorrhage occurred.

A second interesting fact was that during the years of the war, there was an increased occurrence of postpartum hemorrhage among older women and this increase rapidly disappeared after the war. The marked frequency of hemorrhages during the war was due to undernourishment during pregnancy.

From these studies the author concludes, first, that undernourishment during the years of development produces a weakness in the genital apparatus which may later cause postpartum hemorrhage, and secondly, undernourishment during pregnancy and shortly before pregnancy in elderly women may produce an insufficiency in the genital apparatus which may cause weak uterine pains and hemorrhage.

J. P. GREENHILL.

Grosse, A.: Two Observations of Acute Dilatation of the Stomach after Delivery. *Bulletin de la Société d'Obstétrique et de Gynécologie*, Paris, 1928, No. 6, p. 547.

Acute dilatation of the stomach is a common occurrence in surgery, but it is very infrequent in obstetrics. In the latter it may be observed not only after cesarean section but also following vaginal deliveries, normal as well as oper-

ative. The author reports two cases of this complication which occurred after delivery from below. He was able to collect from the literature of the last few years 19 additional cases. Among the 21 cases, 8 followed a cesarean section, one occurred after a Porro operation for rupture of the uterus, two were in eclamptic patients who had received a large amount of chloroform, six followed operative deliveries through the natural passages and four were noted after a spontaneous delivery. Hence more than half of the cases of acute dilatation of the stomach found in obstetric patients occurred after vaginal and not abdominal delivery. One of the author's cases was cured by gastric lavage, and the other by placing the patient on her abdomen.

The cause of the dilatation is a reflex paralysis of the stomach due to a variety of conditions such as postoperative or puerperal infection, the toxic action of anesthetics especially chloroform, abdominal trauma in dystocic labor, and above all a difficult version and extraction, attempts to forcibly express the placenta, and changes in abdominal equilibrium following evacuation of a large uterus. In nearly all the patients who develop this condition there is a predisposing condition.

J. P. GREENHILL.

Buist, R. C.: Posture in Difficult Labour. British Medical Journal, 1924, No. 3319, p. 226.

Most of the devices by which we reduce the difficulty of labor have been practiced, at least in kind, for thousands of years.

A "hanging leg" posture was described and figured by Scipio Mercurio at the end of the sixteenth century, but, though he mentions compression and checking of the bones of the pelvis as a source of difficulty, he did not recognize the position as specifically adapted to that difficulty, but to labor that is difficult "from what cause you will."

The distensibility of the symphysis pubis in pregnant women was long a subject of dispute. Ambroise Paré and Severinus Pinaeus separately report their presence in 1579, at the autopsy of a woman of twenty-four years, who had been hanged for child murder ten days after her delivery.

It was not recognized that this mobility of the bones could be called upon by the posture of the patient to reduce the difficulty of labor in a narrow pelvis until in 1889 Walcher reported that in six cases, by putting the woman with a cushion under her sacrum and her legs hanging, he had secured an increase of from 8 to 13 mm. in the conjugate diameter of the brim.

Obesity was recognized by most of the ancient writers as a source of difficult deliveries. Mercurio discusses it at some length and recommends: (a) reduction of the diet by a third during the last two months of pregnancy, thus forestalling Prochownik; (b) medicines; (c) posture; (d) manipulation. The posture which is described and illustrated is an exaggeration of the hanging leg posture, such that it has been ridiculed as scarcely tolerable even for an aerobate.

The position which the ancient writers prescribed for the delivery of obese women was that on knees and face. This can be traced from Soranus, through Aetius, on to Eucharius Rösslin.

In practice, the hanging leg posture has proved so irksome to the patient that it has not always been possible to maintain it for a sufficient time. The knee-face posture is much easier, as is obvious from its being so often spontaneously adopted.

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